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The Modern Authority for Amateur and Professional

Containing Up-to-date Selected Scientific Formulas, Trade Secrets, Processes, and Money-Saving Ideas

Edited by

GARDNER D. HISCOX, M.E.

AND

PROF. T. O'CONNOR SLOANE, A.B., A.M., EM., PH.D.

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A Guide to How and Where to Procure Ingredients
Illustrated Workshop and Laboratory Methods
Latin Names Translated Into English
A Glossary of Common Names of Chemical Substances

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PREFACE

THE employment of many products of modern Chemistry and Science has rapidly become necessary in the successful operation of the home, the farm, and industry. Until the present time the average person has been given little opportunity to become familiar with the hidden simplicity of chemical and scientific compounds and processes, because in most chemical mixtures all evidence of processing is concealed in the finished product. And with the employment of Latin and trademarked brand names for common concoctions or mixtures, the mysteries of chemical compounds have been effectively preserved.

So-called formulas and trade-named products often impose upon the consuming public a cost from 2 to 100 times greater than need be, once simple understanding is reached. In numerous such cases a simple mixture of two or more common ingredients, purchasable at prices representing a mere fraction of the price of the "named" article, may provide for the user money saving, convenience, and independence. It is to those who may wish to become thus enterprising that FORTUNES IN FORMULAS is devoted and dedicated. For herein will be found the simple key to the mystery-chambers which have heretofore concealed in darkness thousands of recipes and processes which through the labors of the editors are now made available.

In order to assist users who are not in close touch with commercial centers, a classified Buyers' Guide has been placed in the front of the book for handy reference. Here will be found the names and addresses of dealers who handle the various articles needed in compounding most of the formulas contained in this book.

Two special features will be appreciated by readers who have not had the benefit of technical training—a Glossary of Chemical Terms and their corresponding common names, and several pages of useful information concerning the Materials Required in Compounding Formulas.

In the chapter on Laboratory Methods, which contains many illustrations, will be found an outline of practically every operation necessary to the proper compounding of any formula in the book.

The Editors have endeavored to meet the practical requirements of the home and workshop—the mechanic, the manufacturer, the artisan, the housewife, and the general home worker.

Special attention has been given to the newer methods which have recently revolutionized the cosmetic and perfume industry and to this end many ultra-modern formulas have been included on all kinds of beauty preparations.

The electroplating trades have been brought to public notice recently by the introduction of chromium plating; therefore, an excellent method has been explained in detail under that heading.

Many of the formulas representing recent revolutionary progress in the

field of paints, lacquers, varnishes and polishes will be found useful and profitable.

Old formulas and so-called trade secrets which have proved their value by long use are also included, particularly where no noteworthy advance has been made.

In addition to exercising the utmost care in selecting the material from competent sources, the Editors have modified formulas which were obviously ill-adapted to their needs, but became valuable when altered. Processes of questionable merit have been discarded. Much of the matter has been specially translated for this work from foreign technological sources otherwise inaccessible to most English-reading people.

The very latest discoveries in photography have been prepared by the staff of a well-known Research Laboratory. This section offers to the professional as well as the amateur photographer valuable information on lenses, high speed films, developers, exposures, enlargements, colored photography, the miniature camera, etc., etc.

THE EDITORS.

January, 1939.

USEFUL WORKSHOP AND LABORATORY METHODS

It is not necessary for one to be a chemist in order to compound any of the recipes given in this book, but at the same time, the greater the number of efficient methods and time-saving devices with which the worker is familiar, the easier it will be to obtain good results with the least effort.

It is a well known fact in every trade, that if two men are given the same formula to work out, one may produce a satisfactory product while the other may fail. The reasons for this are that one man knows from experience how to put certain ingredients together and exercises more patience and more common sense than the other.

It very often happens that a small oversight or a lack of attention to details may be the cause of the failure to get good results; for instance, if a recipe states that a certain product must be dried before another ingredient is added, it is necessary to be sure that the drying is complete; a little patience exercised at this time may be the deciding point between a good product and a poor one.

It never pays to hurry or to do slipshod work in the laboratory, especially when a new formula is being worked out or a new method is being tried.

This chapter will be devoted to the consideration of the various procedures followed by the chemist when compounding recipes and also to the mechanical aids which he employs as time savers. The several procedures will be taken up and discussed in the following order:

Centrifugation	Distillation	Grinding
Clarification	Evaporation	Precipitation
Crystallization	Emulsification	Solution
Decantation	Fermentation	Specific Gravity
Dialysis	Filtration	Weighing

Centrifugation

A piece of apparatus which has in recent years become one of the technician's most valuable time savers, is the centrifuge. It is used to separate such substances as, cream from milk, liquids of different specific gravity from each other, and solids from liquids when they are held in suspension in such a way that they cannot be filtered. If a substance is so gelatinous that it will not settle from its solution for days, or if it is so finely divided that it will pass

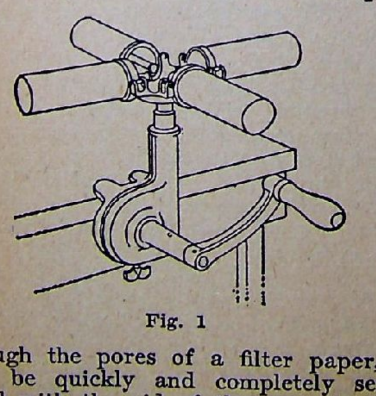

Fig. 1

through the pores of a filter paper, it may be quickly and completely separated with the aid of the centrifuge in a few minutes.

The material is poured into the tubes of the machine, care being taken that tubes placed opposite each other will weigh the same; the whirling action quickly forces the heavier particles to the bottom of the tube and the lighter substance to the top, the two portions may then be very easily separated by pouring one from the other.

Centrifuges are made in various sizes from the small hand type, costing about

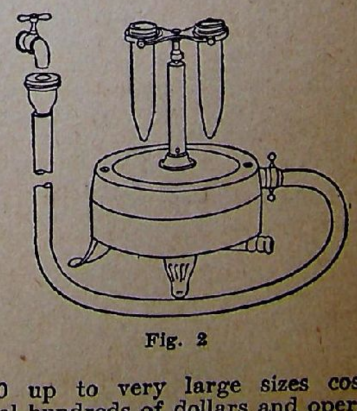

Fig. 2

\$20.00 up to very large sizes costing several hundreds of dollars and operated by electricity or steam. Four types of centrifuges are illustrated; Fig. 1 is operated by hand, Fig. 2 by water and Fig.

3 by electricity. The type with the perforated holder is used to dry precipitates by expressing the moisture through

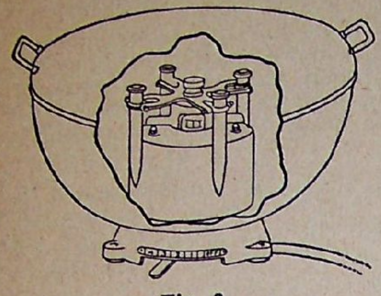

Fig. 3

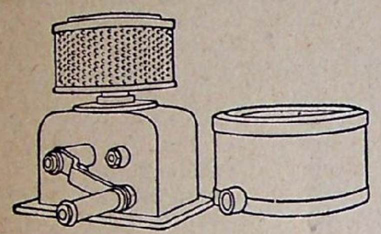

Fig. 4

the strainer. Fig. 4. A good centrifuge may attain a speed of 4,000 revolutions per minute.

Clarification

When a substance is prepared for the market it is a matter of pride to a good workman to make his product as pleasing to the eye as possible. If the article in question is a liquid he will try to have it crystal clear. It may be out of the question to centrifuge such a substance and for this reason some other means must be found for removing any cloudiness. There are several ways in which this may be accomplished depending upon the composition of the article.

Finely divided particles which fail to settle out, may sometimes be made to adhere to a coarser substance which settles quickly and the two may then be removed together. In each instance something should be chosen which is insoluble in and is not effected by any of the chemicals used in the original preparation. Paper pulp may serve the purpose. If this fails charcoal, or pure talc may be employed. Liquids which will stand boiling may be cleared by adding the whites of several eggs, thoroughly mixing them together and then heating the mixture to 80°C. or higher. The coagulation of the albumen of the eggs will gather all of the suspended particles together and when the liquid is filtered it will be found to be perfectly clear.

Crystallization

This process is employed when it is desired to purify certain chemicals. The ordinary chemicals of commerce often contain impurities which must be removed before the chemicals are fit to be used. The principles of crystallization are as follows: When certain substances are dissolved in water until the water cannot take up any more, the resulting solution is known as a saturated solution. This solution is filtered to remove insoluble impurities and if the water is allowed to evaporate, the dissolved substance will be left behind, considerably improved in quality. Under these circumstances a great many substances assume regular and symmetrical forms known as crystals. If several substances are present at the same time, they separate in proportion to their concentration and in proportion to their solubility.

If the soluble impurities are present in relatively small amounts, it is possible to crystallize out the principal substance to a very large degree before the impurity begins to separate, if the remaining solution is then discarded the crystals will be quite pure. If these are redissolved and again crystallized in the same manner, they can be regained almost chemically pure.

The slower the process of evaporation the larger the crystals will be. Stirring produces small crystals. Some chemical salts form beautifully colored crystals and with care some may be made to grow to a considerable size. Copper sulphate lends itself to crystallization very readily and if a solution of this salt is made and set aside undisturbed for slow evaporation, it is possible to select a perfect crystal from among the small ones which first separate and to discard the others. If this perfect crystal is returned to the solution and the evaporation continued, the crystal may be allowed to grow to almost unlimited size. If the crystal is dried and coated with shellac to prevent loss of moisture, it may be kept as an interesting ornament. By selecting certain chemical salts of different colors, such as potassium bichromate, potassium ferrocyanide, etc., an instructive exhibit of

the various forms of crystals may be prepared.

Decantation

Precipitates which settle rapidly and which are insoluble in water may be washed and purified by decantation. This is a time saving operation as compared with washing by filtration. A large volume of water is added to the precipitate in a decantation flask which is then shaken vigorously and the precipitate allowed to settle. When this has occurred the water may be poured off, carrying with it any foreign matter which may be present. This process may be repeated until the washed precipitate remains in a state of relative purity. Flasks of the type illustrated below, called decantation flasks, are especially adapted to this purpose.

A decantation flask is shown in Fig. 5.

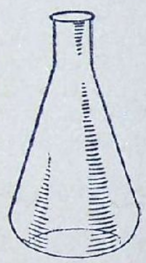

Fig. 5

Dialysis

Dialysis is a process which permits the separation of a crystalline substance from a colloidal or gelatinous one when both are present in the same solution. Crystalline substances readily pass through various animal and vegetable membranes while colloids do not, therefore if a mixture consisting of two substances of this nature are placed in a sac made of an animal membrane or a vegetable one such as collodion and the

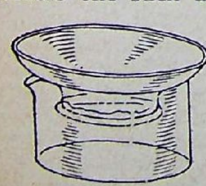

Fig. 6

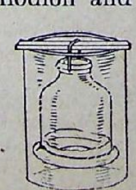

Fig. 7

sac immersed in running water the crystalline salts will pass through the membrane and leave the gelatinous substance behind. Figs. 6 and 7.

Distillation

Distillation is used for the purpose of purifying water and other liquids and also for the separation of liquids of different boiling points from each other. The theory of distillation is as follows: If a solution is boiled it is changed to a vapor, if this vapor is then cooled in a separate vessel it returns to its original state and any solid substance which was present remains in the vessel which was heated. If two liquids of different boiling points such as alcohol and water are mixed together and the mixture heated, it will be found that the boiling point of the mixture lies somewhere between the boiling point of water and the boiling point of alcohol. Pure water boils at about 100°C. which is equal to 212°F. Pure grain alcohol, or as it is chemically known, ethyl alcohol, boils at about 78°C.

If a mixture of equal parts of water and alcohol is boiled the boiling point will be about midway between 78°C. and 100°C. and the vapor when condensed will contain a larger proportion of alcohol than the original mixture because of the fact that the alcohol present will vaporize at this temperature to a greater extent than the water. As the distillation proceeds the boiling point of the mixture will rise because more alcohol than water comes over and the relative proportion of water left behind is constantly increasing, finally, when most of the alcohol is distilled off the remainder will boil at very nearly the temperature of pure water. The temperature at which any such mixture boils is a fair indication of its alcohol content. The nearer 78°C. at which such a mixture boils the greater is the amount of alcohol it contains.

It is neither practical nor economical to try to separate all of the alcohol from water by distillation. There comes a time in any mixture when the condensed vapors contain more water than alcohol and it is useless from the standpoint of time to continue the distillation. Most of the alcohol is recovered from any mixture when one-half the total volume has been distilled. The first runnings contain the greatest proportion of alcohol and the last running the least. The average strength of any distillate depends upon the length of time the still is allowed to operate. If the product obtained from a first distillation is returned to the still and the process repeated the second distillate will contain

a still higher percentage of alcohol than the first.

It is not possible to prepare absolutely pure alcohol by distillation alone. Absolute alcohol is obtained by adding to 95% alcohol some chemical which has a great affinity for water and then distilling the alcohol with this substance present. Some of the substances used are anhydrous copper sulphate, quick lime, etc. Inasmuch as alcohol absorbs water from the atmosphere, it is very difficult to prepare or even to keep absolute alcohol; the highest percentage of alcohol which it is practical to obtain is about 98%.

The essential parts of a distilling apparatus or as it is commonly called, a still, consist of a vessel in which the mixture is to be heated, a tube for conducting the vapors and a receptacle for cooling and collecting the distillate. The number of different styles of distilling apparatus run into the hundreds, but all are adaptations of the above essential parts. Stills are made in different styles to suit the various purposes to which they are to be put. Great care must be exercised to prevent the collection of a sediment on the bottom of the heating chamber. If such a settlement or coating becomes heavy enough the still is apt to become overheated and it may explode. The condensing coil must likewise be closely watched because obstruction to the free passage of the vapors will quickly cause a back pressure and the still will burst, scattering boiling water or alcohol over a wide area, causing serious damage.

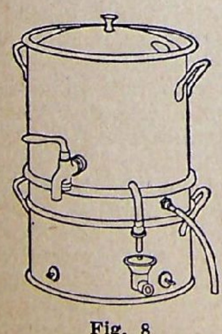

Fig. 8

Condensers are made in various forms according to the kind of product desired. If it is desired to get a yield which contains a high percentage of alcohol at one distillation, a condenser is used which will act so as to break up the vapors as they ascend and allow the heavier to fall back into the still and the lighter to pass on. A condenser of this kind is made of glass and is constricted at intervals; each constriction is provided with a glass bead which partly closes the opening. The rising vapors

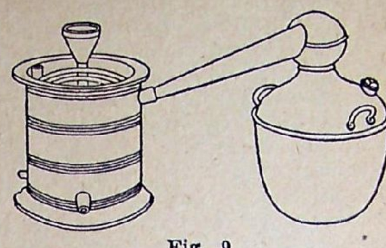

Fig. 9

condense at the first constriction and form a pool surrounding the glass bead which when it is forced up by the pressure from below allows any vapor of a lower boiling point to pass upward and some of the condensed liquid to return to the flask. This is repeated at each constriction and the vapors which finally reach the cooling coil contain very little water.

All parts of a still should be made of

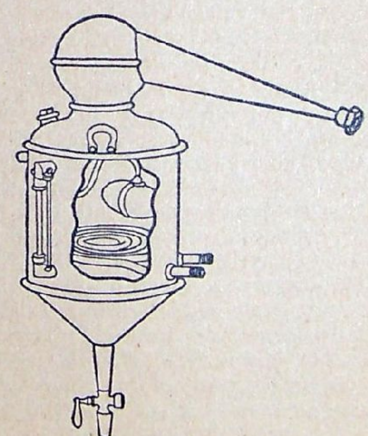

Fig. 10

copper or glass and if of copper it should be well tinned. For efficient action and a pure product the still should be thoroughly cleaned each time it is used. If rubber connections are employed in any kind of still great care must be exercised to prevent any of the vapors from coming in actual contact with the rubber and to this end all tubes should pass completely through the rubber and well beyond it.

Heat may be applied from any source, but care should be taken not to allow the distillation to proceed too rapidly. If so much heat is applied that the boiling is too vigorous the product is apt to be less pure than if it is obtained slowly. Mixtures which boil between 78°C. and 100°C. will produce a much purer product if the still is heated by

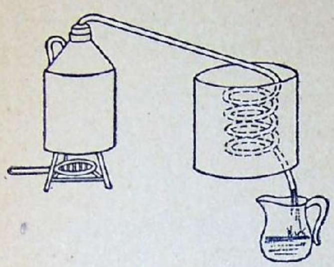

Fig. 11

steam or by being placed in boiling water instead of over an open flame. There is less chance of an accident if this method is followed. Four types of distilling apparatus are illustrated in Figs. 8 to 11.

Dry Distillation

Besides the distillation process described above there are other types of distillation. Dry or destructive is understood to mean the heating of a substance to a point where it is chemically broken up. Volatile decomposition products are thus driven off and may be condensed. The manufacture of illuminating gas and the destructive distillation of wood are examples of this process. The latter example is interesting because it is by this method that acetic acid, methyl or wood alcohol and acetone are made. Dry distillation is carried out by placing the wood or coal in closed ovens from which the air is excluded in order to prevent the wood from taking fire. The gases which arise from the heated wood are condensed and the acid contained therein is neutralized by adding lime which converts it into calcium acetate. The alcohol is redistilled to the required purity.

Distillation in Steam

Substances which are not readily vaporized or which are injured by a high temperature may be distilled in a current of steam. The process is to pass a current of steam through the mixture to be distilled which is also heated independently. The steam carries with it some of the required substance and they are both condensed together, the water being removed later by chemical means.

Fractional Distillation

Fractional distillation is the term applied to the process of redistilling each fraction of a distillate, in order to separate several substances of different boiling points which may be present in the same mixture. The distillate from such a mixture is collected in several receptacles, the receptacles being changed at definite boiling points. These fractions are each redistilled separately, when it will be found that their products will have distinct boiling points and will consist of the several substances which were mixed together in the original sample.

Sublimation

Solids may be distilled as well as liquids, but the process in this case is called sublimation. Many substances, of which iodine is a good example, vaporize and later condense on any cool surface as a solid. In this way nonvolatile impurities may be separated. This process is used to prepare corrosive sublimate and to purify benzoic acid.

Evaporation

When it is necessary to remove the water or other liquid in which a solid is dissolved evaporation is resorted to. There are several ways in which this may be carried out, quickly and economically. The simplest process is to expose the solution to the action of air and sunlight as is done in the recovery of salt from sea water.

If the mixture can be heated without harm it is heated in an evaporating dish until the liquid has evaporated. In the event that the material would be destroyed by heat it may be evaporated by allowing a current of air to pass over the surface or by placing it in a continuous partial vacuum. A desiccator for evaporating small amounts of liquid under reduced pressure is shown in Fig. 12.

Regardless of the temperature of evaporation, the essential thing is to

provide as large a surface as possible because the rate of evaporation is in proportion to the area of the exposed surface. Various types of machines have been introduced which expose to the air a much larger surface than would be possible otherwise. The principle of the most efficient type is that of

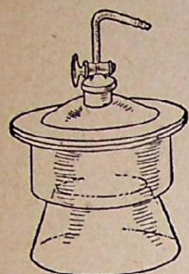

Fig. 12

a revolving drum which dips into the solution to be evaporated. As the drum revolves nine-tenths of its surface is continually undergoing evaporation. The application of heat to the drum hastens this process. When the crystals begin

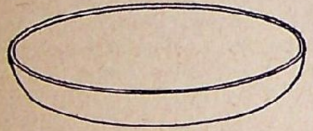

Fig. 13

to separate they are removed from the drum by a scraper and fall into a pan for complete drying.

A steady even heat is desirable for

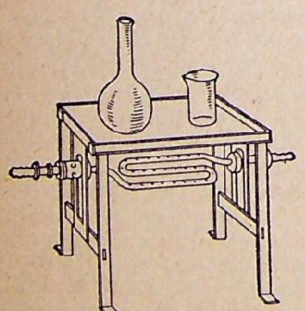

Fig. 14

evaporation and for this purpose the dish may be placed over boiling water, over heated sand or over boiling oil if the nature of the material permits this degree of heat. In fact the temperature of evaporation may be kept at any desired degree without any attention from the operator if a suitable substance is chosen over which to heat it.

Several pieces of apparatus used in evaporating liquids are shown in Figures 13, 14, 15.

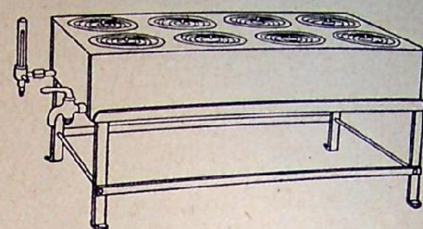

Fig. 15

Emulsification

This process is resorted to when it is desired to suspend a substance such as an oil, in a liquid with which it will not ordinarily mix. Emulsification is principally used to improve the taste or appearance of medicinal preparations. Milk is an example of a perfect emulsion. The methods in use all consist in adding a gummy substance which is intimately mixed with the oil or fat which is to be emulsified. 50% of gum acacia or other similar substance is rubbed up in a dry

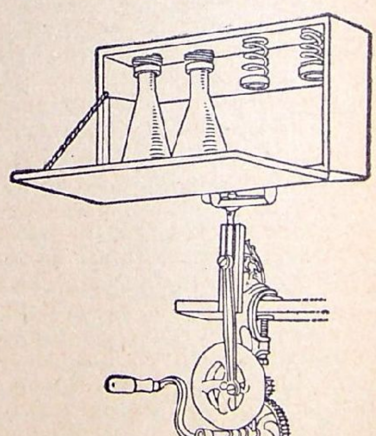

Fig. 16

vessel with the oil until it forms a thick cream. The water is then added slowly with continued stirring until the required consistency is reached. Some oils cannot be permanently emulsified without changing their chemical constitution which is not permissible if they are to be used as medicines or foods. For an emulsion which is to be used within a short time it is customary to employ

gelatine as the supporting medium, but if this is made so that it will flow readily it will not retain its properties as an emulsion for any great length of time. An apparatus used to hasten the process is illustrated. Fig. 16.

Fermentation

Fermentation is a process whereby organic substances are changed by the action of living organisms into simpler chemical compounds. Almost any animal or vegetable substance may be fermented and the end products depend upon the nature of the original substance and upon the kind of organism causing the fermentation. Animal matter, when it decomposes, or ferments, which is the same thing, produces such substances as ammonia, ammonium salts, nitrates, phosphates, etc. Milk when fermented produces principally lactic acid, due to the action of several kinds of bacteria.

All kinds of fruits when fermented by yeast produce alcohol because of the presence of sugar. The alcohol produced is flavored by the particular volatile oils which may be present in the kind of fruit used. When fruit is allowed to ferment spontaneously the fermentation is caused by the various kinds of yeast which always adhere to fruit and to the yeast which is always present in the dust of the air. This kind of yeast is known as wild yeast to distinguish it from yeast which has been carefully selected and grown artificially. This cultured yeast produces a more constant and high grade alcohol than is produced by spontaneous fermentation. The most favorable temperature for alcoholic fermentation is about 24°C. which is equivalent to about 75°F.

Fermentation usually takes place in two stages, the initial stage or main fermentation is turbulent in character being accompanied by the formation of a froth on the surface; this is because the formation of alcohol separates insoluble pectinous substances which rise to the surface as foam. After the major portion of the carbon dioxide has been evolved the fermentation becomes quieter, the second fermentation then begins, during which the remainder of the sugar is turned into alcohol. Fermentation reaches its natural limit when about 12% of alcohol has been formed, because alcohol of this concentration poisons the yeast and prevents it from continuing to act. In addition to alcohol there are formed a number of other substances which are called fusel oils, but are really higher alcohols, so called because their boiling points are higher than that of ordinary alcohol. They are more or less injurious to health.

Generally speaking, two parts of sugar when fermented will produce one part pure alcohol and therefore, knowing the sugar content of the mash the theoretical yield of alcohol may be estimated. According to Pasteur 100 parts of cane sugar yield on an average 48% alcohol, 46% carbon dioxide, 3% glycerine, .6% succinic acid and 1% fusel oil.

Disturbances of fermentation may be occasioned by unsatisfactory temperatures, by the presence of an excess of sugar, occurrence of acetous fermentation and by unsatisfactory yeast.

Acetous fermentation, it is well known, is very prone to accompany alcohol fermentation. It is caused by acetic acid bacteria which are almost always present, but which require oxygen for their development. The formation of acetic acid can take place only with free access of air, hence when preserving fermented liquids the access of air must be prevented as much as possible.

Filtration

Filtration is the means employed when it is necessary to separate a liquid from solid matter which is suspended in it. If the particles are coarse the filtration may be accomplished by pouring the liquid through a cloth of any desired thickness. If the particles are very small, the filter must be correspondingly fine in order to keep them from passing through with the liquid. The filter most often used in the laboratory is made of paper, known as filter paper and comes in various degrees of fineness to suit the quality of the various precipitates. The finer the paper the slower the liquid passes through and the clearer the filtrate will be. As filtration progresses the pores in the filter paper become clogged up by the precipitate and filtration then becomes slower. It is often necessary under these circumstances to adopt some means of hastening the process; this is accomplished in various ways; the simplest is, to use a funnel with a very long stem so that the weight of descending liquid will have a tend-

ency to pull the liquid on the filter paper through at a more rapid rate. Another method is shown in the accompanying illustration which shows the stem of the funnel passing through the cork of a wide mouth bottle. This cork also carries a second tube which is connected to an exhaust pump of some kind which keeps the air in the bottle at reduced pressure and therefore has a tendency to draw the liquid through the paper. Figs. 17, 18.

Fig. 17

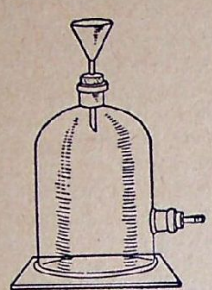

Fig. 18

For filtering a small amount of liquid quickly, it is sometimes sufficient to place a small piece of absorbent cotton in the neck of the funnel and a very short distance down the stem. Fig. 19.

Fig. 19

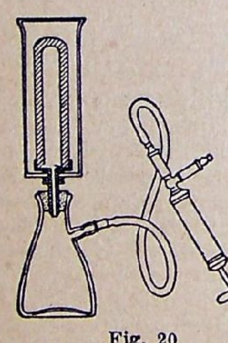

Fig. 20

For exceedingly fine particles, such as bacteria and some kinds of coloring matter, it is necessary to use a filter which is much finer than any kind of paper which can be produced. Among such substances are clay, sand and charcoal. The clay filter is known as a Berkfeld filter and is always used with a suction apparatus. Fig. 20.

The filter paper used comes in various grades, the best paper being pure white and the cheaper grades gray or brown. For very careful work, only the best grade of white paper should be used because the colored papers usually contain soluble matter which passes through with the liquid and sometimes spoils the product. Funnels which are used for filtering should be made so that the sides taper at an angle of 60°, for the reason that when the paper is folded in the customary manner it will only fit a funnel of this shape.

Methods of folding filter paper. Filter paper as usually sold is cut in circles of various diameters to fit various sized funnels. For use they are folded exactly in half into a semi-circle and then folded over once more into a quarter circle. The paper is then carefully opened in the shape of a funnel by having three of the layers on one side and one on the other. When placing it in the funnel care should be taken to press the paper as far down in the funnel as it will go. If this is not done the weight of the liquid is apt to tear the paper. It is sometimes convenient to moisten the paper slightly in order to cause it to adhere to the sides of the funnel. Fig. 21. For more rapid filtration the paper may be folded so as to form what is known as the plated filter. With a little practise, plated filters may be folded almost as quickly as plain filters. The accompanying diagrams will show how this is done.

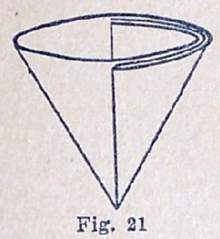

Fig. 21

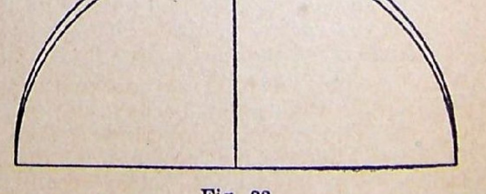

Fig. 22

The paper is first folded in a semi-circle and quarter circle as in making a plain filter. It is then opened out again to a semi-circle as shown in Figure 22.

One side is then folded as shown in Figure 23 and again folded on itself

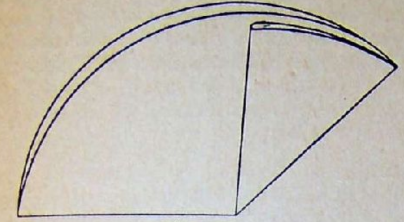

Fig. 23

as shown in Figure 24. The other side is then folded twice in the same manner. The paper is again opened to a

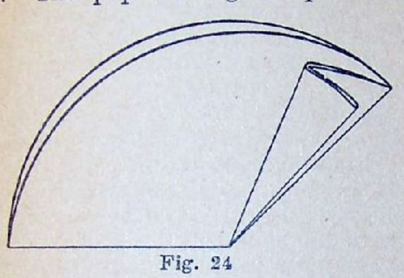

Fig. 24

semi-circle and will be found to have seven creases. The end segment is then folded half way back on itself and with this last small fold as a guide, it is creased sixteen times, each time turning the paper over so as to crease it on opposite sides exactly as a fan is made. It will then appear as Figure 25 and when opened up it will be found divided into thirty-two segments. When placed in a funnel the paper will not fit closely to the glass and the filtered liquid will have free passage. Fig. 26.

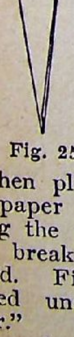

Fig. 25

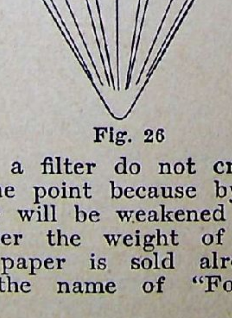

Fig. 26

When plating a filter do not crease the paper to the point because by so doing the paper will be weakened and will break under the weight of the liquid. Filter paper is sold already folded under the name of "Folded filter."

In order to protect this point which is weakest in a filter, it is sometimes necessary to make a miniature filter which fits over the point and thus protects it.

Another method of folding a filter paper which strengthens the weak point is as follows: The paper is folded as usual into a semi-circle, next, the side AB is folded over along the line marked CD. The paper is now turned over and

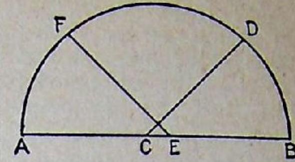

Fig. 27

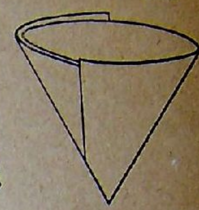

Fig. 28

AE is folded along the line EF. When this paper is opened up the point will be protected by the presence of a double thickness of paper. Figs. 27, 28.

Several types of funnels have been devised to hasten filtration. In some of

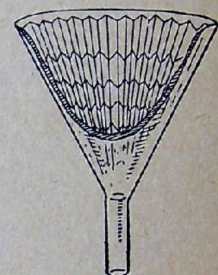

Fig. 29

these the inside of the glass is ribbed like a washboard to prevent the paper from coming in contact with the sides of the funnel at all points. Fig. 29.

For filtering liquids which must be kept warm during the process, holders have been made with double walls and

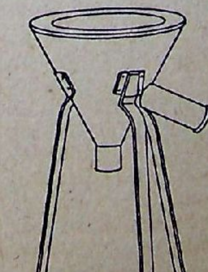

Fig. 30

Fig. 31

which may be filled with hot water. They are also provided with an offshoot which may be kept heated by a Bunsen burner as shown in Figs. 30-31.

Filtration under pressure may be resorted to when it is necessary to hasten the process. This may be accomplished by attaching a long piece of rubber tubing to the stem of a funnel and covering the other large end of the funnel with filter paper which is placed between two pieces of strong cloth which are tied securely to the outside of the funnel as shown in the illustration. If the funnel is now suspended over a large vessel and the liquid to be filtered poured through the tubing with the aid of a second funnel at the higher end, the pressure exerted by the long column of water will force the liquid through the filter paper much more rapidly than would otherwise be the case. Fig. 32.

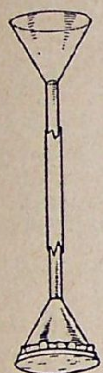

Fig. 32

Grinding and Pulverizing

Reducing any substance to a state of fineness may be a difficult operation or an easy one, depending on the material at hand. If the substance is extremely hard, recourse must be had to a mechanical grinding mill of some kind. Numerous styles of these mills are on the market suitable for various purposes, from rock crushing to the simple pulverization of softer crystals. Fig. 33.

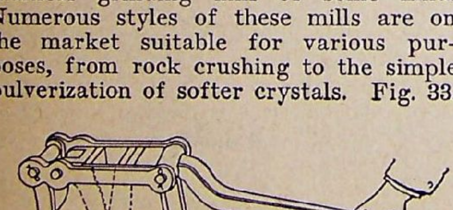

Fig. 33

In some types of pulverizing machines the substance is brought in contact with pebbles in a revolving drum, the constant agitation of the mass and the action of the pebbles quickly reducing the substance to a more or less finely pulverized state. The powder may then be recovered by sifting it from the pebbles. Figs. 34, 35. The customary way of

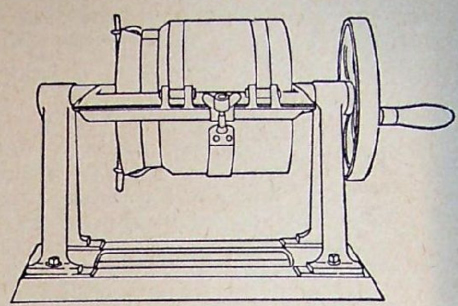

Fig. 34

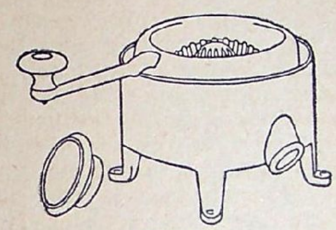

Fig. 35

grinding small amounts of substances in the laboratory is with the aid of a mortar and pestle. These mortars are sold in glass, porcelain, agate and metal. The substance to be pulverized is added to the mortar in small quantities at a time and rubbed with the pestle by a circular motion and more or less pressure. Fig. 36. Gummy and sticky substances

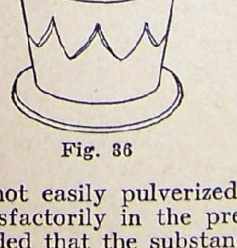

Fig. 36

which are not easily pulverized may be ground satisfactorily in the presence of sand, provided that the substance is one which may be separated from the sand by some such means as taking advantage of its solubility or of a different specific gravity.

After the material has been reduced to a powder it may be separated into portions of different degrees of fineness by means of wire screens which are made so as to allow powders of any desired fineness to pass through. These screens are numbered according to the number of openings to the square inch. Fig. 37.

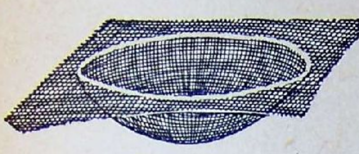

Fig. 37

Precipitation

The process of precipitation is resorted to by the chemist more often than by the artisan and is used to separate certain elements which may be in solution, by adding some other chemical which combines with the element it is desired to separate, forming an insoluble compound which is immediately precipitated. For instance, if it is desired to separate the element silver from a solution in which it is held as a soluble salt, such as silver nitrate, it is only necessary to add common table salt. This will combine with the silver to form silver chloride which will immediately separate as an insoluble precipitate. This precipitate may then be separated by filtration and the silver recovered. Any soluble salt of iron may be changed to an insoluble one by the addition of ammonia, while copper may be made to act likewise by adding a soluble sulphide. Any substance used to precipitate another is called a precipitant and the remaining solution is known as the supernatant fluid.

Solution

When any substance is dissolved in a solvent, it is said to be soluble and the resulting product is called a solution. When the solvent is alcohol, the product is called an alcoholic extract or a tincture. A substance which dissolves in water and which may be recovered in the same form by the evaporation of the water is said to be in simple solution. If any chemical is used so that the substance is made soluble by changing its state, it is known as a chemical solution and the original substance cannot be recovered in the same form in which it was added. For instance, metallic copper is dissolved by nitric acid, but in the process the copper is changed to copper nitrate and therefore cannot be recovered as metallic copper.

Water is the most used solvent, alcohol takes second place and then such substances as glycerine, ether, acetone, turpentine, carbon tetra chloride, etc. The most used chemical solvents are hydrochloric acid, nitric acid and ammonia.

If there is any doubt as to whether a substance is soluble in water or in any other solvent, it is only necessary to shake it with some one of these and then to allow it to stand for a short time. If some of the liquid is then evaporated to dryness, there will be a residue left of more or less bulk depending upon the extent to which the material is soluble in the particular solvent used.

The principal aid to rapid solution is pulverization which allows the solvent to come in contact with as large a surface as possible. Heat is next in importance because most substances are more soluble at high temperatures than they are at low temperatures. Agitation hastens solution because it constantly replaces with fresh solvent any of the solution which immediately surrounds the solid and which would otherwise tend to retard the process because of its saturation. Numerous mechanical aids to agitation may be made by anyone handy with tools, after the pattern illustrated in Fig. 38. The power to

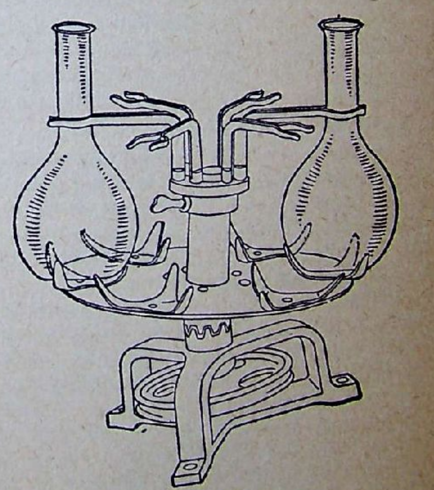

Fig. 38

operate this machine may be obtained from a water motor or any other simple source.

Maceration. When a substance is allowed to go into solution by simply placing it in contact with the solvent at ordinary temperatures, the process is called maceration. This operation is used when it is not permissible to use heat because of the danger of injuring the product.

Infusion. When heat is applied in the above process by first boiling the water and pouring it over the material to be dissolved, the product is called an infusion. It is used when the substance may be submitted to a fairly high degree of heat for a short time without injury. It is employed almost exclusively in removing the soluble matter from flowers, leaves, roots, seeds, etc.

Digestion. This is usually considered to mean the conversion of a substance into the soluble state with the aid of a solvent which is kept at a constant temperature for a rather long period of time, depending upon the nature of the material. For this purpose a waterbath, a sandbath or an incubator is employed to maintain the desired degree of heat which is usually just below the boiling point of the solvent. The substance acted upon is placed in a covered dish to prevent rapid evaporation and left to itself until the process is completed. It is principally used for the decomposition of minerals which are but slowly acted upon by the solvent.

Percolation. This is an economical and rapid method of extracting the soluble matter from a large mass of material with a minimum amount of solvent. For this purpose a piece apparatus known as a percolator is used. Fig. 39. The drugs are first ground and stirred with the solvent to form a thick porridge which is then placed in the percolator. Care should be taken that the drug is packed so that no fissures are present which would allow the solvent to pass through without coming into prolonged contact with the drug and yet not tight enough to prevent the solvent from seeping through. Alcohol of the desired percentage is poured on the drug to form a layer of about 3 inches and the percolator is then covered. The maceration may be considered at an end in about three days and the solvent allowed to run off. The quantity of the solvent used varies according to the degree of concentration of the extract it is desired to produce. The percolate is usually divided into a first run corresponding to about 85% of the extractible matter and a secondary percolate may be as large as may be necessary to complete the extracting.

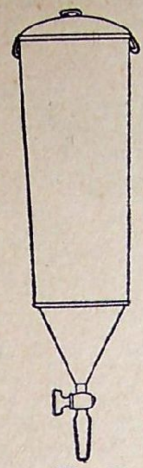

Fig. 39

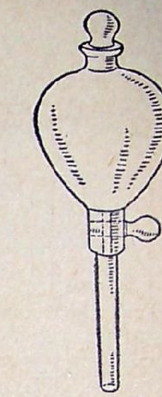

Fig. 40

This is then concentrated by distillation to any desired strength.

Another method of extraction is that of shaking out. In this method the object is to remove certain substances from a liquid by means of adding another liquid in which the substance is more soluble. It is necessary that the second liquid be one which will not mix with the first. In practice, aqueous or alcoholic liquids containing aromatic substances are shaken with chloroform, benzene, carbon tetra chloride, or similar liquids into which the aromatic substance will pass. The mixture is then placed in what is known as a separating funnel and the heavier one which sinks to the bottom is allowed to pass off by opening the stop-cock. Fig. 40.

Weighing

The accuracy with which a substance may be weighed depends on the sensitiveness of the scale and the skill of the operator. The analytical chemist requires a balance which will weigh accurately such small amounts as one-tenth of a milligram. A scale for weighing material to be used in compounding recipes need not be sensitive to less than one-tenth of a gram. The precautions to be observed in weighing are as follows: Do not allow corrosive substances to come in contact with the metal pans

of a scale because the pans will be ruined and the material contaminated. Always counterbalance two pieces of paper or a dish on the pans and add the material to this. Do not touch the weights with the fingers as they will soon become corroded and either increase or decrease in weight and thus interfere with the accuracy of the scale. Always manipulate the weights with a pair of forceps. Figs. 41, 42.

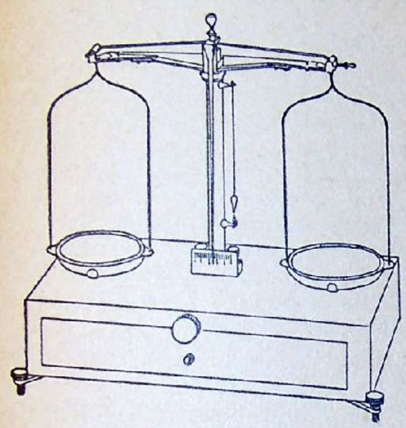

Fig. 41

The metric system of weights and measures is much more convenient than the English system and as its principles are learned in a few minutes all workers should purchase scales with gram

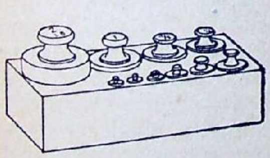

Fig. 42

weights. Most formulas are based on the metric system and if avoirdupois weights are used it is necessary to convert one into the other before the work can go on.

Formulas which are written so that the quantities are given in so many parts of each ingredient are adapted to either system and if such figures as three parts of salt and one part of soda are given, they may be interpreted as meaning three ounces of salt and one ounce of soda or three grams of salt and one gram of soda or any other amount that the worker finds convenient to employ as a unit.

It is always best, when trying a new recipe, to make a small quantity of a product the first time, so as not to waste materials and also so as to be able to change the consistency or color or other quality to suit one's particular ideas, before the whole material is made up. It is also wise to use the best chemicals procurable because as one gains experience the cheaper grades may be employed with more safety.

Liquids may be weighed or measured. If weighed, the vessel is first counterbalanced on the scale pan and the liquid is then added and weighed in the same way that a solid would be.

A very convenient type of scales is shown here. They are provided with a sliding weight which is a great aid in counterbalancing the pans in the event of paper or other container being necessary. Fig. 43.

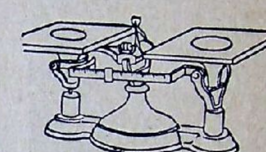

Fig. 43

Specific Gravity

A great many people have difficulty in understanding what is meant by specific gravity. An effort will be made to explain what is meant by this term.

It is well known that alcohol is lighter than water and that tar is heavier. If three vessels of the same size are each filled with one of these substances and then weighed it may be found that the alcohol may weigh two pounds, the water three pounds and the tar six pounds. From this it will be seen that the alcohol weighs ⅔ as much as the water and the tar twice as much. We are now able to say that any amount of this alcohol weighs ⅔ as much as the same quantity of water. This is the same thing as saying that the specific gravity of alcohol is ⅔ or expressing in decimals .66 and the same thing as saying that the specific gravity of tar is 2. Water being the most abundant fluid we possess it is taken as the standard and is called 1. If any fluid is lighter than water its specific gravity is expressed as a decimal and if heavier it is expressed as a whole number.

If it is desired to find the specific gravity of a liquid, all that is necessary is to weigh a definite quantity of it in

a bottle known as a specific gravity bottle, Fig. 44, and then to fill the same

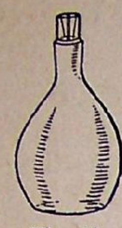

Fig. 44

bottle with water and weigh that. The weight of the liquid divided by the weight of the water gives the specific gravity of the liquid. It is necessary to deduct the weight of the bottle itself from each weighing before the result is computed. The formula for this determination is as follows:

$$\frac{\text{Weight of substance}}{\text{Weight of water}} = \text{specific gravity.}$$

For large quantities of liquids it is possible to use an instrument known as

Fig. 45

a hydrometer which is placed in the liquid. The extent to which the hydrometer sinks depends upon the specific gravity of the liquid. Markings on the stem indicate the specific gravity and they may be read directly without any calculation. This instrument is made in many forms which are classified according to whether they are to be used for liquids lighter or heavier than water. Fig. 45.

Specific Gravity of a Solid

The principle of this method is the same as for a liquid but the operation is somewhat different. If a solid is immersed in a liquid it will displace an amount which is equal to its own volume. At the same time it will lose in weight an amount which is equal to the weight of the amount of liquid it displaced. Therefore if we know the amount of weight it loses on being immersed in water, we know its volume and also the weight of the volume of water displaced. If its weight in air is divided by the amount it loses when placed in water or, what is the same thing, the weight of water displaced, the result is its specific gravity. Substances soluble in water may have their specific gravity estimated by weighing them in some liquid in which they are insoluble. For instance, the specific gravity of sugar may be taken in alcohol and then converted into its true figure by proportion.

The specific gravity of substances lighter than water may be taken by attaching to them a heavier mass of metal which will make them sink. The specific gravity of the metal is then deducted from that of both together and the specific gravity of the substance is the remainder.

HOW AND WHERE TO PROCURE INGREDIENTS AND EQUIPMENT

IF the reader is to pursue either a money-saving or money-making course of action in the use of this book—or even if he may proceed with purposes which make these factors secondary—access to the right prices and to convenience of procurement will add to the effectiveness and satisfaction of his pursuits.

Fortunately for the amateur, there are few walls of price protection or monopolies of exclusiveness in the industries to which he will turn for materials or equipment; he will not be obliged to pay premium prices if he may not happen to be engaged in manufacturing or distributing commercially; catalogues with one-price designations are available for the mere asking, from manufacturers, wholesalers, jobbers, retailers. Usually prices vary only with quantity or grade; many containers are returnable for full credit; transportation cost is allowed on quantity items; information is freely given.

If occasional difficulty may be encountered in dealing with any supplier, or if special aid is desired, mention of FORTUNES IN FORMULAS will probably open doors for you; for while your publishers take no direct part in any trading transactions between the users of its publications and suppliers, a bond of wholesome respect for the book exists throughout the world of industrial science and chemistry, wherein courtesy favors are frequently exchanged.

With a view to providing owners of FORTUNES IN FORMULAS with at least an introduction and a fair start toward accessibility of materials, equipment, service, and prices, the Editors have provided "A Buyers' Guide" (see page xix).

MEASURING MADE EASY

It will be noticed that many of the formulas in this book call for so many parts of each ingredient rather than for so many ounces or other definite amounts. For instance, on page 145 the formula for camphor ice is given as follows:

White wax	16 parts
Benzoated suet	48 parts
Camphor, powdered	8 parts

Formulas like the above are given in parts in order that they may be easily compounded by the worker who has but little equipment. As it may not always be necessary to make the exact quantity that a definite formula would produce, formulas stated in parts lend themselves more readily to variations in total quantity of finished product, as explained more fully below.

Formulas expressed in parts fall into three general classes; those in which all the ingredients are *liquid,* those in which all are *solid,* and those in which solids and liquids are mixed.

CLASS I

Ingredients Are All Liquids

The formula may call for parts and half parts as follows:

Chromic acid	$2\frac{1}{2}$ parts
Ammonia	15 parts
Sulphuric acid	$\frac{1}{2}$ part
Cuprammonia sol.	30 parts

In this case one part may be considered to mean one cupful and 10 parts to mean 10 cupfuls. If this will make more or less than the quantity desired, all that is necessary is to substitute one spoonful for each part if less is wanted, and one quart for one part if more is wanted. The following examples will make this clear:

For a small quantity use the following: (The figures in the original formula are doubled so as to make the fractions whole numbers.)

Chromic acid	5 spoonfuls
Ammonia	30 spoonfuls
Sulphuric acid	1 spoonful
Cuprammonia sol.	60 spoonfuls

For a larger quantity use the following:

Chromic acid	$2\frac{1}{2}$ quarts
Ammonia	15 quarts
Sulphuric acid	1 pint
Cuprammonia sol.	30 quarts

CLASS II

Ingredients Are All Solids

Where the ingredients are all solids, parts may be considered to mean ounces, pounds or tons, depending upon the quantity desired, as follows:

ORIGINAL RECIPE	FOR SMALL QUANTITY TAKE	FOR LARGER QUANTITY TAKE
Borax 2½ parts	2½ ounces	2½ pounds
Glass 10 parts	10 ounces	10 pounds
Soda 3 parts	3 ounces	3 pounds

CLASS III

Ingredients Are Solids and Liquids in Combination

The following formula calls for a certain number of parts of substances, some of which are solid and some liquid:

Beeswax	8 parts
Water	56 parts
Potash carbonate	4 parts

For a small quantity use one-eighth of the figures given and consider them as ounces:

Beeswax	1 ounce avoirdupois
Water	7 fluid ounces, or a little less than ½ pint
Potash carbonate	½ ounce avoirdupois

For a larger quantity use:

Beeswax	8 pounds
Water	56 pounds, equal to 56 pints, or 7 gallons
Potash carbonate	4 pounds

In cases where liquids are of such nature that they cannot be measured in fluid ounces, it is necessary to weigh them just as solids are weighed. Thick tar would be such a substance, and in this case a vessel is counterbalanced on the scale and sufficient additional weights added to the pan to make up the required amount. The tar is then added until the scale balances.

ANILINE COLORS AND DYESTUFFS

National Aniline & Color Co., Inc.
40 Rector St., New York, N. Y.

Bachmeier & Co.
438 W. 37th St., New York, N. Y.

Maher Color & Chemical Co.
620 Orleans St., Chicago, Ill.

Andreykovics & Dunk
58 N. Front St., Philadelphia, Pa.

ASPHALTS AND PITCHES

The Barrett Co.
40 Rector St., New York, N. Y.

Barber Asphalt Co.
1900 Land Title Bldg., Philadelphia, Pa.

Allied Asphalt & Mineral Corp.
217 Broadway, New York, N. Y.

Zophar Mills, Inc.
591 Court St., Brooklyn, N. Y.

BARBERS' SUPPLIES

Lewis Bros., Inc.
142 W. 24th St., New York, N. Y.

Buchholtz & Co.
513 Third Ave., New York, N. Y.

BOTTLE CAPS

Anchor Cap & Closure Corp.
22 Queens St., Long Island City, N. Y.

Crown Cork & Seal Co.
219 36th St., Brooklyn, N. Y.

Dipolene Mfg. Co., Inc.
19 Fulton St., Brooklyn, N. Y.

General Seal Co.
175 Varick St., New York, N. Y.

National Seal Co.
14th Ave. and 37th St., Brooklyn, N. Y.

The Williams Sealing Corp.
Decatur, Ill.

BOTTLERS' MACHINERY

Alsop Engineering Corp.
89 W. 60th St., New York, N. Y.

Budde & Westerman
104 Worth St., New York, N. Y.

Arthur Colton Co.
Detroit, Mich.

Geller-Barstaedt Co.
161 E. 33rd St., New York, N. Y.

Satisfaction Supply Co.
51 W. 3rd St., New York, N. Y.

BOTTLERS' SUPPLIES

Acme Cork Co.
893 Third Ave., New York, N. Y.

American Cork Specialty Co.
115 Sutton St., Brooklyn, N. Y.

Armstrong Cork Co.
295 Fifth Ave., New York, N. Y.

Atlantic Cork Co.
4313 Third Ave., Brooklyn, N. Y.

Consolidated Cork Co.
55 Bogart St., Brooklyn, N. Y.

Keystone Bottler Supply Co.
4338 White Plains Rd., New York, N. Y.

BOXES (Cosmetic)

Box Novelties, Inc.
55 E. 11th St., New York, N. Y.

Clark Box & Label Co.
Jamestown, N. Y.

F. N. Burt Co.
540 Seneca St., Buffalo, N. Y.

BOXES (Paper)

Atlantic Carton Co.
Norwich, Conn.

Baltimore Paper Box Co.
Baltimore, Md.

Dennison Mfg. Co.
Framingham, Mass.

Robert Gair Co.
350 Madison Ave., New York, N. Y.

Randolf Box Co.
Chicago, Ill.

BOXES (Wood)

Bogert & Hopper
225 Varick St., New York, N. Y.

The Green Co.
90 W. Broadway, New York, N. Y.

United Box & Lumber Co.
131 Franklin St., Newark, N. J.

CANS (Tin)

Acme Can Co.
1150 Broadway, New York, N. Y.

American Can Co.
230 Park Ave., New York, N. Y.

Continental Can Co.
100 E. 42nd St., New York, N. Y.

Metal Package Corp.
110 E. 42nd St., New York, N. Y.

Wilson & Bennett Mfg. Co.
6540 So. Menard Ave., Chicago, Ill.

CHEMICAL APPARATUS

Central Scientific Co.
220 E. 42nd St., New York, N. Y.

Eimer & Amend
205 Third Ave., New York, N. Y.

Empire Laboratory Supply Co.
559 W. 132nd St., New York, N. Y.

Fischer Scientific Co.
709 Forbes St., Pittsburgh, Pa.

Emil Greiner Co.
55 Van Dam St., New York, N. Y.

Palo-Myers, Inc.
81 Reade St., New York, N. Y.

A. H. Thomas & Co.
West Washington Square, Philadelphia, Pa.

The Will Corp.
Rochester, N. Y.

CHEMICALS

J. T. Baker Chemical Co.
Phillipsburg, N. J.

City Chemical Co.
132 W. 22nd St., New York, N. Y.

Chas. Cooper & Co.
194 Worth St., New York, N. Y.

Eastman Kodak Co.
343 State St., Rochester, N. Y.

Eimer & Amend
205 Third Ave., New York, N. Y.

General Chemical Co.
P. O. Box 397, Reading, Pa.

Merck & Co., Inc.
Rahway, N. J.

Porter Chemical Co.
Hagerstown, Md.

CHEMICALS, EXPERIMENTAL LOTS

R. F. Revson Co.
91 Seventh Ave., New York, N. Y.

CHEMISTS (Analytical)

Associated Industrial Chemists
1918 71st St., Brooklyn, N. Y.

Chas. V. Bacon
3 Park Row, New York, N. Y.

Bendiner & Schlessinger
10th St. and 3rd Ave., New York, N. Y.

Samuel F. Sadtler & Son, Inc.
210 So. 13th St., Philadelphia, Pa.

CHEMISTS (Industrial, Consulting & Research)

Associated Industrial Chemists
1918 71st St., Brooklyn, N. Y.

Grinstead Laboratory
505 Fifth Ave., New York, N. Y.

Arthur D. Little, Inc.
30 Charles River Road, Cambridge, Mass.

The Orthmann Laboratories, Inc.
647 W. Virginia St., Milwaukee, Wis.

COLLAPSIBLE TUBES

Bond Mfg. Co.
Wilmington, Del.

Globe Collapsible Tube Corp.
28 Columbia Heights, Brooklyn, N. Y.

A. H. Wirz, Inc.
Chester, Pa.

CONFECTIONERY, JAMS AND PRESERVES

Le Roy's International Candy Service
1612 Neptune Ave., Brooklyn, N. Y.

CONTAINERS (Fibre)

Bird & Sons, Inc.
East Walpole, Mass.

Carpenter Container Corp.
137 41st St., Brooklyn, N. Y.

Chemical Sales Corp.
75 West St., New York, N. Y.

ESSENTIAL OILS

Dodge & Olcott Co.
180 Varick St., New York, N. Y.

Florasynth Laboratories, Inc.
1513-1533 Olmstead Ave., New York, N.Y.

Givaudan-Delawanna, Inc.
80 Fifth Ave., New York, N. Y.

Magnus, Mabee & Reynard, Inc.
32 Cliff St., New York, N. Y.

Riddle Chemical Co.
35 So. Dearborn St., Chicago, Ill.

Geo. W. Smith & Sons
83 Natoma St., San Francisco, Cal.

van Ameringen-Haebler, Inc.
315 Fourth Ave., New York, N. Y.

FLAVORING EXTRACTS

Baker Extract Co.
79 Wall St., New York, N. Y.

Chicago Spice Flavoring Extract Co.
920 So. Western Ave., Chicago, Ill.

Essential Materials Co.
59 Fulton St., New York, N. Y.

Florasynth Laboratories, Inc.
1513-1533 Olmstead Ave., New York, N.Y.

Polak's Fruital Works, Inc.
350 W. 31st St., New York, N. Y.

van Ameringen-Haebler, Inc.
315 Fourth Ave., New York, N. Y.

GLASS BOTTLES AND JARS

Brockway Sales Co.
Brockway, Pa.

Hazel Atlas Glass Co.
Wheeling, W. Va.

Owens Illinois Glass Co.
Toledo, Ohio

Whitall Tatum Co.
Philadelphia, Pa.

GUM SPECIALISTS

George H. Lincks
123 Front St., New York, N. Y.

GUMS AND RESINS

Geo. H. Lincks
123 Front St., New York, N. Y.

Gillespie-Rogers-Pyatt, Inc.
80 John St., New York, N. Y.

Innis Speiden & Co., Inc.
117 Liberty St., New York, N. Y.

LABELS

Acme Seal & Label Co.
382 Lafayette St., New York, N. Y.

American Label Co.
216 W. 18th St., New York, N. Y.

Dennison Mfg. Co.
Framingham, Mass.

Ever-Ready Label Corp.
141 E. 25th St., New York, N. Y.

Randolf Box & Label Co.
843 W. Van Buren St., Chicago, Ill.

LAUNDRY CHEMICALS

Consumers Chemical Co.
Philadelphia, Pa.

Legrand Bleach Corp.
111 49th St., Brooklyn, N. Y.

Solvay Sales Corp.
61 Broadway, New York, N. Y.

Sunshine Soda Co.
45 E. 17th St., New York, N. Y.

The Ultramarine Co.
Bound Brook, N. J.

MINERAL FILLERS

Chas. B. Chrystal Co.
11 Park Place, New York, N. Y.

D. H. Litter Co.
110 W. 40th St., New York, N. Y.

Whittaker Clark & Daniels, Inc.
245 Front St., New York, N. Y.

OILS AND FATS

Archer-Daniels-Midland Co.
233 Broadway, New York, N. Y.

Cook-Swan Co.
122 E. 42nd St., New York, N. Y.

National Oil Products Co.
Harrison, N. J.

Spencer Kellogg & Sons Sales Corp.
Buffalo, N. Y.

Welch, Holme & Clark Co., Inc.
563 Greenwich St., New York, N. Y.

The Werner G. Smith Co.
Cleveland, Ohio

PAINT COLORS AND PIGMENTS

Fezandie & Sperrle, Inc.
205 Fulton St., New York, N. Y.

Harshaw Chemical Co.
Cleveland, Ohio

Imperial Color Works
Glen Falls, N. Y.

C. K. Williams & Co.
Easton, Pa.

PAINT AND PAINT MATERIALS

Bade Bros.
84 Bowery, New York, N. Y.

H. Behlen & Bro.
10 Christopher St., New York, N. Y.

PAPER (Glassine)

Baehm Co.
219 Fulton St., New York, N. Y.

Direct Wax Paper Co.
413 W. Broadway, New York, N. Y.

PATENT AND TRADEMARK LAWYERS

L. F. Randolph
726-B Ninth St., N. W., Washington, D. C.
(Patents secured and Trade-Marks registered)

PERFUMERS AND SOAP-MAKERS SUPPLIES

Evergreen Chemical Co., Inc.
160 Fifth Ave., New York, N. Y.

Newman Buslee and Wolfe
224 W. Huron St., Chicago, Ill.

Orbis Products Trading Co.
215 Pearl St., New York, N. Y.

Odorbase Mfg. Co.
108 Fulton St., New York, N. Y.

van Ameringen-Haebler, Inc.
315 Fourth Ave., New York, N. Y.

PHOTOGRAPHIC CHEMICALS

International Research Laboratories
1612 Neptune Ave., Brooklyn, N. Y.

PLATING

Cohan Epner Co.
122 Center St., New York, N. Y.

Gustave Cropsey
348 W. 42nd St., New York, N. Y.

D. W. Haber and Son
109 West 64th St., New York, N. Y.

RESINS (Synthetic)

The Barrett Co. (Cumar)
40 Rector St., New York, N. Y.

Bakelite Corporation (Bakelite)
247 Park Ave., New York, N. Y.

General Plastics, Inc. (Durez)
North Tonawanda, N. Y.

The Resinous Products & Chemical Co. (Amberol)
222 W. Washington Square, Philadelphia, Pa.

SOLVENTS

American Mineral Spirits Co.
332 So. Michigan Ave., Chicago, Ill.

The Barrett Co.
40 Rector St., New York, N. Y.

Commercial Solvents Corp.
230 Park Ave., New York, N. Y.

Rossville Commercial Alcohol Corp.
Terre Haute, Ind.

TRIETHANOLAMINE

Carbide & Carbon Chemicals Corps.
30 E. 42nd St., New York, N. Y.

WAXES

A. C. Drury & Co.
219 E. North Water St., Chicago, Ill.

Frank B. Ross Co.
79 Wall St., New York, N. Y.

Strahl & Pitsch Co.
141 Front St., New York, N. Y.

COMMON OR EVERYDAY NAMES OF CHEMICAL SUBSTANCES

Common Names	*Chemical Names*
AQUA FORTIS	NITRIC ACID
AQUA REGIA	NITRIC AND HYDROCHLORIC ACIDS
BAKING SODA	SODIUM BICARBONATE
BARYTA, HEAVY SPAR	BARIUM OXIDE
BARYTES	BARIUM SULPHATE
BLUE STONE, BLUE VITRIOL	COPPER SULPHATE
BORAX, TYNKAL	SODIUM TETRABORATE
BRIMSTONE	SULPHUR
BUTTER OF ANTIMONY	ANTIMONY TRICHLORIDE
CALOMEL	MERCUROUS CHLORIDE
CARBOLIC ACID	PHENOL
CAUSTIC POTASH	POTASSIUM HYDROXIDE
CAUSTIC SODA	SODIUM HYDROXIDE
CHALK	CALCIUM CARBONATE
CINNABAR	MERCURY SULPHIDE
COPPERAS, GREEN VITRIOL	FERROUS SULPHATE
CORROSIVE SUBLIMATE	MERCURIC CHLORIDE
CREAM OF TARTAR	POTASSIUM BITARTRATE
EPSOM SALTS	MAGNESIUM SULPHATE
FLAKE WHITE, PEARL WHITE	BISMUTH SUBNITRATE
FLUORSPAR	CALCIUM FLUORIDE
GLAUBERS SALTS	SODIUM SULPHATE
GRAIN ALCOHOL	ETHYL ALCOHOL, ETHANOL
GYPSUM	CALCIUM SULPHATE
HORN SILVER	SILVER CHLORIDE
HYPO	SODIUM THIOSULPHATE
LAUGHING GAS	NITROUS OXIDE
LITHARGE	LEAD OXIDE
LIVER OF SULPHUR	POTASSIUM SULPHIDE
LUNAR CAUSTIC	SILVER NITRATE
LYE	SODIUM OR POTASSIUM HYDROXIDE
MAGNESIA	MAGNESIUM OXIDE
METHYLATED SPIRITS, WOOD ALCOHOL	METHYL ALCOHOL—METHANOL
MOSAIC GOLD	TIN BISULPHIDE
MURIATIC ACID	HYDROCHLORIC ACID
OIL OF VITRIOL	SULPHURIC ACID
ORPIMENT	ARSENIC TRISULPHIDE
PEARL ASH	POTASSIUM CARBONATE

COMMON OR EVERYDAY NAMES OF CHEMICAL SUBSTANCES

Common Names	*Chemical Names*
PLASTER OF PARIS	CALCIUM SULPHATE
PLUMBAGO, BLACK-LEAD	GRAPHITE
PRECIPITATED CHALK	CALCIUM CARBONATE
PRUSSIAN BLUE	FERRIC-FERROCYANIDE
PRUSSIC ACID	HYDROCYANIC ACID
PYRO	PYROGALLIC ACID
QUICKLIME	CALCIUM OXIDE
QUICKSILVER	MERCURY
RED LEAD, MINIUM	LEAD OXIDE
ROCHELLE SALT	POTASSIUM AND SODIUM TARTRATE
SAL AMMONIAC	AMMONIUM CHLORIDE
SAL SODA	SODIUM CARBONATE—CRYSTALLINE
SALT OF SORREL	POTASSIUM QUADROXALATE
SALT (COMMON)	SODIUM CHLORIDE
SALTPETER CHILE	SODIUM NITRATE
SALTPETER, NITRE	POTASSIUM NITRATE
SAL VOLATILE	AMMONIUM SESQUICARBONATE
SALT OF HARTSHORN	AMMONIUM CARBONATE
SLAKED LIME	CALCIUM HYDROXIDE
SODA ASH	SODIUM CARBONATE
SPIRIT OF HARTSHORN	AMMONIA
SPIRITS OF SALT	HYDROCHLORIC ACID
SUGAR OF LEAD	LEAD ACETATE
TARTAR EMETIC	ANTIMONY AND POTASSIUM TARTRATE
TIN ASHES	STANNIC OXIDE
VERDIGRIS	COPPER ACETATE
VINEGAR	ACETIC ACID
WASHING SODA	SODIUM CARBONATE
WATER GLASS	SODIUM SILICATE
WHITE COPPERAS	ZINC SULPHATE
WHITE LEAD	LEAD CARBONATE
WHITE VITRIOL	ZINC SULPHATE
WHITE ZINC	ZINC OXIDE

LATIN NAMES OF DRUGS AND CHEMICALS TRANSLATED INTO ENGLISH

Latin has been universally adopted in writing prescriptions. Necessity demanded a uniform international method, and since Latin was the universal language when science and chemistry were in their infancy, its use has been retained throughout the civilized world. It was not adopted, as supposed by many, in order to mystify or to enable purveyors to charge exorbitant prices for simple products.

Absinthium (*Artemisia absinthium*)—Wormwood
Acacia (*Mucilago acaciæ*)—Gum Arabic
Acetum Opii—Vinegar of Opium
Acetum Scillæ—Vinegar of Squill
Acidum Aceticum dilutum—Acetic acid diluted
Acidum Arsenosum—White arsenic. Arsenous acid
Acidum Benzoicum—Benzoic acid
Acidum Boricum—Boric acid
Acidum Carbolicum (Phenol)—Carbolic acid
Acidum Citricum (Syrupus acidi C.)—Citric acid
Acidum Hydrochloricum—Muriatic acid, Hydrochloric acid
Acidum Hydrocyanicum dilutum—Prussic acid
Acidum Hypophosphorosum dilutum—Diluted hypophosphorous acid
Acidum Lacticum—Lactic acid
Acidum Nitricum dilutum—Diluted Nitric acid
Acidum Oleicum—Oleic acid
Acidum Phosphoricum—Phosphoric acid
Acidum Salicylicum—Salicylic acid
Acidum Stearicum—Stearic acid from solid fats
Acidum Sulphurosum—Sulphuric acid: sulphur dioxide and water
Acidum Tannicum—Tannic acid, from Nutgall
Acidum Tartaricum—Tartaric acid
Aconitum—Aconite, Aconitum Napellus
Æther (Ethyloxide)—Ether
Alcohol dilutum (alcohol 50% and water)—Diluted Alcohol Spirit
Allium (syrupus *Allii*)—Garlic
Aloe Barbadensis (*Aloe vera*)—Barbadoes Aloes
Aloe Socotrina (*Aloe perryi*)—Socotrine Aloes
Alumen (Alumen Exsiccatum)—Alum, Dried or burnt Alum
Alumini Hydras—Aluminum hydrate
Alumini Sulphas—Aluminum Sulphate
Ammoniacum (Gum of *Dorema ammoniacum*)—Ammoniac
Ammonii Benzoas—Ammonium Benzoate.
Ammonii Bromidum—Ammonium Bromide
Ammonii Carbonas (Preparation Spiritus Ammoniæ aromaticus)—Ammonium Carbonate; aromatic spirits of ammonia
Ammonii Chloridum—Ammonium chloride
Ammonii Iodidum—Ammonium iodide
Amylum (Glyceritum Amyli)—Starch
Antimonii et Potassi Tartras—Tartar emetic, Tartrated antimony
Antimonii Sulphidum—Antimony Sulphide
Apocynum (*Apocynum cannabinum*)—Canadian hemp
Aqua destillata—Distilled water, pure water
Aqua ammoniæ (10% by weight of gas)—Ammonia water; aromatic spirits of Ammonia
Aqua Ammoniæ fortior (28% by weight of gas)—Stronger ammonia water
Aqua Anisi—Anise Water
Aqua Camphoræ—Camphor water
Aqua Chlori—Chlorine water
Aqua Fœniculi—Fennel water
Aqua Hydrogenii Dioxidi—Hydrogen dioxide
Argenti Cyanidum ($AgCN$)—Silver cyanide
Argenti Iodidum (AgI)—Silver iodide
Argenti Nitras ($AgNO_3$)—Silver nitrate
Argenti Nitras Fusus—Lunar caustic
Argenti Oxidum (Ag_2O)—Silver oxide
Arnicæ Flores (*Arnica montana*)—Arnica flowers
Arseni Iodidum (AsI_3)—Arsenic iodide
Asafœtida (*Ferula fœtida*)—Asafetida
Asclepias (*Asclepias tuberosa*)—Pleurisy root
Aspidium (*Dryopteris marginalis*)—Male fern
Atropinæ (Alkaloid of *Atropa belladonna*)—Atropine, deadly nightshade
Auri et Sodii Chloridum—Gold and Sodium Chloride.
Belladonnæ Folia (*Atropa belladonna*)—Belladonna leaves
Belladonnæ Radix—Belladonna root
Benzinum (from Petroleum)—Benzin
Benzoinum (*Styrax benzoin*)—Balsamic resin, Benzoin
Bismuthi et Ammonii Citras—Bismuth and ammonia citrate

Bryonia (*Bryonia alba*)—Bryony
Buchu (*Barosma betulina*)—Buchu
Caffeina—Chief extract of Tea and Coffee
Caffeina Citrata—Citrated caffeine
Calamus (*Acornus calamus*)—Sweet flag
Calcii Bromidum—Calcium Bromide
Calcii Chloridium—Calcium chloride; Lime and chloride
Calcii Hypophosphis—Calcium Hypophosphite
Calcii Sulphas Exsiccatus—Dried Gypsum
Calendula (*Calendula officinalis*)—Marigold
Calumba (*Jateorhiza palmata*)—Calumba
Calx (CaO from white marble, calcium carbonate, oyster shells)—Lime
Calx Chlorinata—Chlorinated lime
Calx Sulphurata—Sulphurated lime
Cambogia (gum-resin Garcinia Hanburii)—Gamboge
Camphora (Steropten *Cinnamomum camphora*)—Camphor
Cannabis Indica (*Cannabis sativa*)—Indian hemp
Cantharis (Insect, *Cantharis vesicatoria* dried)—Spanish flies
Capsicum (*Capsicum fastigiatum*)—Cayenne pepper
Carbo Animalis—Animal charcoal
Carbo Ligni—Charcoal
Cardamomum (*Elettaria repens*)—Cardamom
Cascarilla (*Croton eluteria*)—Cascarilla
Cassia Fistula—Purging Cassia
Cetraria—Iceland Moss
Charta Potassii-Nitratis—Potassium Nitrate paper
Charta Sinapis—Mustard paper
Chenopodium—American wormseed
Chloral—Chloral hydrate
Chloroformum—Chloroform
Chondrus—Irish moss, Carragheen
Coca (*Erythroxylon coca*)—Coca
Cocainæ Hydrochloras—Hydrochlorate of Cocaine
Coccus (female bug *Coccus cacti*)—Cochineal
Codeina—Alkaloid from Opium
Collodium—Pyroxylin, ether and alcohol
Collodium Flexile—Flexible Collodium
Colocynthis (*Citrullus colocynthis*)—Colocynth
Creosotum—Mixture of Phenols of wood-tar; creosote
Creta præparata ($CaCO_3$)—Prepared chalk
Crocus (*Crocus sativus*)—Saffron
Cubeba (*Piper cubeba*)—Cubeb
Cupri Sulphas—Copper sulphate
Elastica (*Hevea*)—India-rubber
Emplastrum—Plaster
Emulsum—Emulsion
Eucalyptol (*Eucalyptus globulus*)—Eucalyptus
Eupatorium (*Eupatorium perfoliatum*)—Thoroughwort.
Extractum—Extract.
Fel Bovis—Oxgall, ox bile
Ferri Carbonas Saccharatus—Sugared iron carbonate
Ferri Chloridum—Iron chloride
Ferri Citras—Iron citrate
Ferri et Ammonii Citras—Iron and ammonia citrate
Ferri et Ammonii Sulphas—Iron and am. Sulphate
Ferri et Ammonii Tartras—Iron and am. tartrate
Ferri et Strychninæ Citras—Iron and Strychnine citrate
Ferri Hypophosphis—Iron and hypophosphite
Ferri Sulphas—Iron Sulphate
Ferrum—Iron
Glycerinum—Glycerin, from decomposition of fats
Hamamelis—Witch hazel
Hedeoma—Pennyroyal
Humulus (*H. lupulus*)—Hops
Hydrargyri Chloridum Corrosivum—Corrosive mercuric chloride, corrosive sublimate
Hydrargyrum (Hg)—Mercury, Quicksilver
Ichthyocolla—Isinglass
Infusa—Infusion.
Iodoformum—A preparation containing Iodine
Iodum (I)—A heavy metal
Ipecacuanha (*Cephœlis I.*)—Ipecac
Linimentum—Liniment
Linum (*Linum usiatissimum*)—Flaxseed,
Liquor Calcis—Solution of Lime, lime water
Lithii Benzoas—Lithium Benzoate
Lobelia (*Lobelia inflata*)—Lobelia
Lupulinium (*Humulus lupulus*)—Lupulin
Macis (*Myristica fragrans*)—Mace
Magnesia (MgO)—Calcined Magnesia, Light magnesia
Mangani Dioxidum—Black oxide of Manganese
Matricaria (*M. chamomilla*)—German Chamomile
Mistura Cretæ—Chalk mixture
Morphinæ—Morphine, Alkaloid of Opium, Poppy plant
Moschus—Musk, from preputial follicles of Musk ox
Mucilago—Mucilage of various gums and extracts
Naphthalenum—Hydrocarbon from coal tar
Naphthol—Phenol or alcohol from coal tar, derivative from coal tar camphor
Nux Vomica (*Strychnos nux-vomica*)—Nux Vomica, Strychnia Alkaloid
Oleatum—Acid oil from fats
Oleoresina—Resin oils, composed of ether, the resins of the plant, and minerals
Oleum—Fixed or volatile oils from plants and organic substances, as Oil of Bergamot, oil of tar
Oleum Adipis—A fixed oil expressed from lard
Opii Pulvis—Powdered Opium
Opium (*Papaver somniferum*)—"Sleep making Poppy," thick exudation of poppy; alkaloid, morphine, Heroine, etc.
Pancreatinum—Enzymes from pancreas of warm-blooded animals. Enzymes

are substances in an elementary cell which enter food and cause a chemical change that breaks up the food for digestive purposes, into starch and other proteids

Pepsinum (enzyme from stomachs of healthy pigs, etc.)—Pepsin. Digests 3000 times its own weight of Albumen

Pepsinum Saccharatum—Sugared pepsin, 9 to 1

Petrolatum Liquidum—Liquid Petroleum

Phosphorus—Phosphorus

Physostigma (*P. venenosum*)—Calabar bean

Pilocarpus (*P. selloanus*)—Jaborandi

Pimenta (*Pimenta officinalis*)—Allspice

Piper (*Piper nigrum*)—Black pepper

Piperinum—Neutral principle obtained from pepper, etc.

Pix Burgundica (*Abies excelsa*)—Resin of Burgundy Pine

Pix Liquida (*Pinus palustris*)—Pine tar

Plumbum—Lead. Lead combines with several remedies

Plumbi acetas—Lead acetate, sugar of Lead

Podophyllum (*P. peltatum*)—Roots of May Apple

Potassa (KOH)—Potash. Combines with several minerals

Potassa cum Calce—Potassa with Lime

Potassa Sulphurata—Lime of Sulphur; Sulphurated potassa

Potassii Acetas—Potassium Acetate

Potassii Bicarbonas—Potassium Bicarbonate

Potassi Bichromas—Potassium Bichromate

Potassii Bitartras—Cream of Tartar

Potassii et Sodii Tartras—Rochelle Salts

Potassii Nitras—Saltpetre

Pyroxylinum—Soluble Gun Cotton

Resina—Resin. Resins are made by distilling off volatile oils

Sapo—Soap. White Castile prep. Soda and Olive oil

Sapo Mollis—Soft Soap, Linseed oil 40, potassa 9, alcohol 4, water sufficient

Sinapis Alba (*Brassica alba*)—White mustard

Sinapis Nigra (*Brassica nigra*)—Black mustard

Sevum (Fat of Ovis Aries)—Mutton suet

Soda—Soda

Sodium and Sodii—Soda (Combines with a large number of bases to form sodium compounds, of which but few have common names)

Sodii Acetas—Soda and acetic acid

Sodii Arsenas—Soda and arsenic

Sodii Benzoas—Benzoate of soda

Sodii Bicarbonas—Bicarbonate of soda

Sodii Chloridum (NaCl)—Salt

Sodii Sulphas—Glauber's Salt

Spiritus—Spirit. (Combination of alcohol or etherial oils with medicinal or other substances)

Spiritus Menthæ Viridis—Essence of Spearmint

Spiritus Myrciæ, Spirit of Myrcia—Bay rum

Spiritus Ferri chloridi—Chloride of Iron

Spiritus Hyoscyami—Henbane, Fetid nightshade, Poison tobacco

Spiritus Iodi—Metallic element from seaweed

Spiritus Myrrhæ—Myrrh

Spiritus Nucis Vomicæ—Nux vomica, poison nut of India

Spiritus Opii—Opium, Laudanum, Poppy plants. Alkaloids are morphine, codeine, narcotine, papaverine, thebaine, laudamine, etc.

Strychnia (*Strychnos nux-vomica*)—Alkaloid of Nux Vomica

Sulphuris Iodidum—Sulphur iodide

Sulphur Lotum—Washed Sulphur

Syrupus—Syrups are forms of preparing a great number of medicines, both single and in formulas, but generally act only as a medium. Syrups are made of 850 parts of sugar and 150 parts of water, and cannot be described except by formulas.

Tabacum (*Nicotiana tabacum*)—Tobacco.

Terebinthina (*Pinus palustris*)—Oleoresin, Turpentine

Terebinthina Canadensis (*Abies balsamea*)—Canada balsam, Balsam of Fir

Thymol (Phenol of *Thymus vulgaris*)—Thyme, Garden Thyme

Tinctura—Tinctures are alcoholic solutions, of non-volatile substances, alcohol acting as solvent and preservative

Tinctura Asafœtidæ—Asafetida

Tinctura Cannabis Indicæ—Indian Hemp, Weed of Hashish

Tinctura Cantharidis—Spanish fly

Tinctura Capsici—Capsicum, Red Pepper

Tinctura Cardamomi—Cardamom

Triturationes — Triturations — usually prepared with 90% of sugar of Milk and 10% of the principle

Trochisci—Lozenges or troches are prepared with mucilage and sugar, and the principle, intended to dissolve slowly in the mouth

Trochisci Acidi Tannici—Tannic acid

Trochisci Ammonii Chloridi—Ammonium Chloride and additions

Trochisci Cretæ—Chalk and additions

Ulmus—Slippery Elm

Unguentum—Lard (8 parts), Yellow wax (2 parts), Ointment

Vini Gallici—Brandy

Vitellus—Yolk of egg

Zinci Acetas—Zinc Acetate

Zincum—Zinc (Metallic Zinc is combined with a number of medicinal principles)

LATIN ABBREVIATIONS WITH ENGLISH DEFINITIONS

āā.—Of each
Abd.—The belly
Acc.—Accurately
Ad.—To, up to
Adhib.—To be administered
Ad. lib.—At pleasure
Ad. mov.—Let there be added
Æg.—The sick one
Agit.—Shake, stir
Agit. ante sum.—Shake before taking
Alb.—White
Alt.—The other
Alt. hor.—Every other hour
Alv.—The belly, the bowels
Amp.—Large
Aq. (Aqua)—Water
Aq. astr.—Frozen water
Aq. bull.—Boiling water
Aq. ferv. vel cal.—Hot water
Aq. pot.—Drinking water
Bals.—Balsam
Bene.—Well, good
Bib.—Drink (thou)
Bis.—Twice
Bis in die.—Twice a day
Bol.—A large pill
Brach.—Arm
Bul.—Let it, or them, boil
But.—Butter
C.—A gallon
Calom.—Mild chloride of merc.
Cap.—Let him take
Caput.—Of the head
Carbas.—Linen, lint
Caute.—Cautiously
Cc.—Cubic centimeter. (One Gram)
Cena.—Supper
Chart.—Paper
Chin. (cinchona)—Quinine
Cib.—Food, victuals
Coch. (cochleare—By Teaspfl.
Coch. amp.—A dessertspfl. (ʒij)
Coch. mag.—Tablespfl., Half Ounce (℥ss)
Coch. med.—Dessertspfl.—(ʒij)
Coch. parv.—Teaspfl. (ʒj)
Golat.—Of the strained liquor
Coli.—The neck
Collum.—A nasal wash
Collut.—A mouth wash
Commis.—Mix together
Concis.—Cut
Cong.—A gallon
Cont. rem.—Continue the medicine
Coq.—Boil them
Cor.—Of the heart
Cort.—Bark
Cras.—Tomorrow
Cuj.—Of which; of any
Curs hod.—During the day
Cyath.—A wineglass (℥ j-ij)
D.—A day, a dose
Da, Det.—Give; Let it be given
Dec.—Pour off
Decem.—The tenth
Decoct.—A decoction (by boiling)
Decoq.—Boil down
Deglut.—To be swallowed
Det. in dup.—Let twice as much be given
Dieb. alt.—Every other day
Dieb. tert.—Every third day
Dies vel D.—A day
Dil.—Dilute thou; diluted
Div. in p. æq.—Divided in equal parts
Dol.—Pain. In pain
Don. alv. dejec.—Until the bowels move
Don. len. dol.—Until the pain is relieved
Dos. (Dosis)—A dose
Dr. ʒ —A drachm, 60 grains, $\frac{1}{8}$℥
Dulc. (Dulcis)—Sweetness, sweet
Dur. dolor.—While the pain lasts
Em. (Emesis)—Vomiting
Et.—And
Ex.—From; out of
Ex paul. aq.—In a very little water
Ext., Extr.—An extract
F. (Fac)—Make (thou)
F. pil. xij.—Make twelve pills
Far. (Farina).—Flour
Fas. lint.—A linen bandage
Febr.—Fever
Ferv.—Hot
Flor. (flores).—Flowers
Fluid. vel Fl.—Liquid
Fol. (folia)—Leaves
Ft. (fiat)—Let it (or them) be made
Ft. collyr.—Let eye-wash be made
Ft. emuls.—Let emulsion be made
Ft. en.—Let enema be made
Ft. pulv.—Let a powder be made
Ft. suppos. viij.—"8 suppositories"
Ft. ung.—Let ointment be made
Garg.—A gargle
Gm. (gramma).—A gramme; Gram
Gm. (gramma).—A gramme; $\frac{1}{4}$ f. Dr.
Gr. (Granum)—A grain; $\frac{1}{60}$ Dram
Grum. (Grumus)—A clot (of blood)
Gtt. (Gutta)—A drop, Drops
H. (Hora)—An hour
Haust.—A draught
Hebdom.—A week
Herb (Herba)—An herb
Heri.—Yesterday
Hirudo.—A leech
Hor. (Hora)—An hour
Hor. decub.—At bedtime
Hor. j spat.—After one hour
Id. (Idem)—The same
Iden.—Repeatedly; often
Infus.—An infusion
Injec.—An injection
In plum.—In gruel
Iter.—Let it be repeated
Jam.—Now
Jentac.—Breakfast
Juscel.—A broth
Juscul.—A soup

Jux (juxta)—Near to, close by
K. (Kali)—Potassa, potassium
Lac. (lactis)—Milk; of milk
Lan (Lana)—Flannel; wool
Lang.—Languor, Faintness
Larg. (Largus)—Abundant; plenty
Larid. (Laridum)—Lard
Lat.—Broad; wide; the side
Lat. admov.—Let it be applied to side
Lat. dol.—To the painful side
Lax. (Laxus)—Loose; open
Lb., (Libra)—A pound
Lect.—A bed
Len.—Easily; gently
Len. ter.—By rubbing gently
Lig.—A ligature
Linim.—A liniment
Lint.—Lint, linen
Liq.—A solution
Lot. (Lotio)—A lotion
M., ♏—A Minim; about a drop
M. (Misce)—Mix; mix thou
M. (manipulus)—A handful
Mane—Morning; in the Morning
Manus—The hand
Mass. (Massa)—A mass
Matut.—In the morning
Med. (Medius)—Middle
Mens.—By measure
Min.—A minim
Minut.—A minute
Mis.—Let it be mixed
Mis. bene.—Mix well
Mist.—A mixture
Mod. dict.—As to be directed
Modic.—Moderate-sized
Mol. (Mollis)—Soft
Mor. sol.—In the usual manner
Natr. (Natrium)—Sodium
Nig.—Black
Nisi.—Unless
No.—In number
Noct.—Of the night
Noct. maneq.—Night and morning
Non.—Not
Non. repetat.—Not repeated
Noxa.—An injury
Nunc.—Now
Nux.—A nut
O. (Octarius)—A pint (℥xvj) 16 oz.
Oct. (Octo)—Eight
Ocul. (Oculus)—The eye
Ol. O. Opt.—Best Olive oil
Olla.—A pot, a jar
Omn. hor.—Every hour
Omn. bih.—Every two hours
Omn. quadr. hor.—Every quarter hour
Omn. mane.—Every morning
Omn. nocte.—Every night
Op. (Opus)—Need, occasion
Opt.—Best
Oryza.—Rice
Os (Oris)—Osmium, Mouth
Ov. (Ovum)—Egg
P.—By weight
Pallid.—Pale
Pt. æq.—Equal parts
Part. vic.—In divided doses
Parv.—A little
Pastil.—A pastille, a lozenge
Pauc.—Little, a few
Paul.—Little by little
Pect. (Pectus)—The breast
Percol.—Strain through
Pes.—The foot
Pess.—A pessary
Ph.—A vial; a bottle
Pil. (Pilula)—A pill
Pilus—The hair
Ping. (Pinguis)—Fat; grease
Poc. (Poculum)—A cup; a little cup
Pon. P.—By weight
Post. cibos.—After meals
Postrid.—On the next day
Pot. (Potus)—A drink
Præ.—Before, Very
Prand.—Dinner
Primus—The first
Pro.—For; before; according to
Prop.—Special; particular
Pro. rat. æt.—According to the age of the patient
Prox.—Nearest
Pug.—A pinch
Pulm.—Gruel, Pulmentum
Pulv.—Powder
Pulv. gros.—A coarse powder
Pulv. Subtil.—A smooth powder
Pulv. ten.—A fine powder
Pur. (Purus)—Pure, clean
Purg.—A purgative
Q. (Quadrans)—A 4th Part, a quart, 32 oz., 2 pints
Q. lib., Q. p.—As much as you please
Qq. (Quisque)—Each or every
Qq. hor.—Every hour
Q. s.—As much as is sufficient
Q. v.—As much as you please
Quad.—Fourfold
Quam.—As much as
Quart. (Quartus)—Fourth
Quat. (Quater)—Four times
Quinq (Quinque)—Five
Quor. (Quorum)—Of which
Quotid.—Daily
℞ (Recipe)—Take
Rec.—Fresh, newly
Renov.—Renew, let it be renewed
Resid.—Residual, remaining
Rum. Rumen.—The throat
S. V. R.—Alcohol
S. V. T.—Rectified Spirits
Sac. lac.—Sugar of Milk
Sac. sat.—Sugar of lead
Sæp.—Frequently
Sal.—Salt
Sal am. (Amarum)—Magnesium sulphate
Sal mir. (mirabile)—Sodium Sulphate
Sal vol. (volatile)—Ammonium Carbonate
Sap.—A flavor, delicacy
Sat.—Enough, sufficient
Saturat.—Saturated
Scrup., ℈.—A Scruple (20 grains) 24 to an ounce
Scut. pect.—For protection to the breast
Sed.—The fundament, feces
Semel.—Once
Semidr.—Half a dram
Semih.—Half an hour
Sensim.—Gently, gradually
Separ.—Separately

Sept.—Seven
Septim.—A week
Sesq.—One and a half
Sesqh.—An hour and a half
Sesunc.—An ounce and a half
Sev. (Sevum)—Tallow; suet
Si—If
Sic—So, thus
Sic.—Dry. Let it be dried
Sig. (Signa)—Write (Thou)
Sign.—Clearly, distinctly
Simul.—Together
Sin.—Without
Sing.—Of each
Sit.—Let it be
Solut.—A solution
Som. (Somnus)—Sleep
Spt.—Spirit
Spt. vin. rect.—Rectified spt of wine
ss (Semis)—A half
St.—Let it stand
Stat.—Immediately
Stib. (Stibium)—Antimony
Stillat.—Drop by drop
Stom.—By stomach
Subind.—Frequently
Suc.—Sap, juice
Sum.—Let him take
Suppos.—Suppository
Syr.—Syrup
T. d., T. i. d.—Three times a day
Tab.—A lozenge, tablet
Teg.—A cover
Temp. (Tempus)—Time; temple
Tep. (Tepidus)—Tepid, lukewarm
Ter.—Three times, thrice
Tere, Teret.—Rub, let it be rubbed
Tert.—Third
Thion. (Thionas)—Sulphur
Tinct., vel Tr.—Tincture
Tinct. herb. rec.—Tincture fresh herbs
Trit.—Triturate
Troch.—A lozenge, troche
Tus. (tussis)—A cough
Tuto.—Safely
Uln. (Ulna)—The arm, elbow
Ult.—At the last
Ult. præsc.—The last ordered
Una.—Together
Unc. ℥ (uncia)—An ounce, 8 drams
Unct.—Anointed, besmeared
Ung.—An ointment, unguent
Urg.—Urgent, pressing
Ust.—Burnt
Ut dict.—As directed
Vas.—A vessel, utensil, bottle
Vas. vit.—A glass vessel
Vehic.—Menstruum, a vehicle
Vel.—Or
Venen.—A poison
Vesp.—In the evening
Vic.—Change
Vin.—Wine
Vir.—Strength, vigor, life
Virid.—Green
Vitel.—Yolk
Vol.—Volatile

USEFUL INFORMATION CONCERNING THE MATERIALS CALLED FOR IN THIS BOOK

Agar-Agar.—A gelatinous material obtained from certain seaweeds found in the Pacific Ocean. It dissolves to a jelly-like mass and it is used for bacteriological work, in jellies, medicines and adhesives.

Alabaster.—A hydrous sulphate of lime or gypsum, occurring in a very fine grained and translucent form. In the purest form it is snow-white but it occurs also colored due to the presence of metallic oxides. It is found chiefly in Europe, where on account of its softness it is carved into sculptures and various decorative objects.

Alcohol.—Commonly ethyl, grain or ethanol. To be distinguished from methyl, wood or methanol which is poisonous and different in chemical structure.

Alloy.—Chemically a solid solution of two or more metals, although even mixtures of metals are included in the term. An alloy has a melting point called the eutectic, which is lower than that of any of its components.

Alum.—Commonly potassium alum, which is a combination of potassium and aluminum sulphates. It occurrs as the mineral kalinite. It is very astringent and is used for purifying water. Soda alum or chrome alum are similar combinations where the potassium has been replaced by the corresponding metals.

Alumina.—An oxide of aluminum which occurs in the amorphous or crystalline state as in corundum and bauxite. It is used in porcelain manufacture.

Amber.—A natural fossil resin found in Northern Europe. It is hard brittle, of a yellow or orange color and at times transparent. When rubbed it becomes electrically charged. It is to be distinguished from synthetic products such as the phenolic resins.

Asbestos,— Amianthus.—The common name given to a variety of fibrous minerals. The word is derived from the Greek meaning incombustible. Asbestos occurs in different types varying in chemical composition. The most important is a variety found in large quantities in Canada and known as Chrysotile. Asbestos is widely used as a heat insulator, for packing and for fireproof garments and fabrics.

Asphalt.—A black or brownish deposit of bituminous character found in various countries. It occurs in the solid and plastic state. Chief among the deposits are the ones in Trinidad and Bermudez. A high quality is found in Utah and is named Gilsonite. Asphalts are also derived from petroleum by distillation. These are termed as oil-asphalts.

Bakelite.—The trade name (after its inventor) for a resin made from the reaction of phenol and formaldehyde. It may be produced in transparent clear or colored masses. When powdered and mixed with various filling materials it may be molded under heat and pressure to obtain numerous articles. It is strong, takes a high polish, is a good electrical insulator and is resistant to water, alcohol, and acids.

Balsam of Peru.—A viscous, sticky resin obtained from a tree in Central America. It comes deep brown or black in color, and has an aromatic odor. It is used in medicine and perfumery.

Bentonite.—A clay-like mineral consisting of hydrous aluminum silicate. It is of very fine grain size, capable of absorbing large amounts of water and has a very high plasticity. It is used in the manufacture of colloidal solutions. It is found in Wyoming.

USEFUL INFORMATION CONCERNING THE MATERIALS CALLED FOR IN THIS BOOK

Benzene,— Benzol.—The chemical name given to a hydrocarbon derived from the distillation of coal tar. Benzene forms the basis of the aromatic compounds and the coal-tar dyes. It is a good solvent and in admixtures with gasoline forms an automotive motor fuel. To be distinguished from benzine.

Benzine.—A volatile fraction from the distillation of petroleum and lighter than gasoline. It is composed of a mixture of different hydrocarbons.

Benzoin.—An aromatic resin derived from a tree in the East Indies. It is yellowish brown in color and is used in medicine and as incense.

Black Treacle.—A viscid uncrystallizable syrup which drains from the sugar refiner's molds. Sometimes called sugar-house molasses.

Bloodstone.—A variety of chalcedony or quartz. It occurs as an opaque or translucent mineral, bright or dark green in color and interspersed with small red spots.

Bole.—A non plastic clay. The presence of iron oxide gives it a yellowish to brown color.

Bronze.—The name given to the alloys composed of copper and tin in which these two metals are chemically combined. Zinc as well as other metals are often added to improve its casting qualities. Bronze is usually cast while brass is usually drawn.

Burgundy Pitch.—The name given to a resin obtained from the Norway Spruce found in the Vosges Mountains and in the Alps. It is also obtained from a variety of pine found in the United States. It is opaque yellowish brown and of a more or less brittle nature. It looks like rosin, and in composition it is about the same containing more or less turpentine and emulsified water.

Camphor.—A white resin distilled from an evergreen found in China and Japan. It is translucent, unctuous to the touch and volatile. It is used in the manufacture of celluloid, explosives and disinfectants.

Caoutchouc,— India Rubber.—The milky juice or latex obtained from incisions made in several plants. When cured it comes as a dark rubbery mass impermeable to water.

Caramel.—A brown somewhat bitter substance obtained by heating sugar and used for coloring confectionery and beverages.

Carbolic Acid,— Phenol.—A colorless crystalline substance derived from coal tar by distillation. It is used in the production of synthetic resins and as an antiseptic. It is poisonous.

Casein.—A protein (nitrogenous) substance found in milk. It is obtained from skimmed milk by precipitation with rennet or acids. It is hardened by chromates or formaldehyde. It is insoluble in water and alcohol, but is attacked by alkalies. It is used in making molding materials, imitation ivory, pastes and glues, leather dressings and sizes. Galalith is made from casein.

Castile Soap.—A high grade of soap made principally from olive oil and caustic soda. It comes in white and green color depending on the shade of the oil used.

Celluloid.—A synthetic material made by treating nitro-cellulose with camphor. It is transparent, elastic and easily molded at about 100° C. Celluloid is insoluble in water but soluble in alcohol and other organic solvents.

Ceresine.—When pure, it is refined ozokerite (a natural mineral wax). Usually adulterated with paraffin wax.

Chalk.—A soft white or grayish form of calcium carbonate found mainly in England and France. It is widely used in industry in paints, putties, polishes, rubber and crayons. It is graded commercially according to color, fineness and purity.

USEFUL INFORMATION CONCERNING THE MATERIALS CALLED FOR IN THIS BOOK

Chlorophyl.—The green coloring matter of leaves, occurring as microscopic granules distributed throughout the cells. It may be extracted with alcohol and ether.

Cocoa Butter.—A fat extracted from the cocoa-nibs. It is a yellowish white solid turning to yellow on ageing. It is used medicinally and in confectionery. It resists rancidity very well.

Coconut Oil.—An oil obtained from the kernels of the coconut palm. It is a white solid at ordinary temperatures and is used in the manufacture of soap and candles.

Colophony.—The rosin remaining after distilling the turpentine from the exudation of several varieties of pine tree found in Europe and North America. It is a reddish-brown translucent and easily fusible solid. Colophony or rosin as it is commonly called is used in varnishes, soluble oils, belt dressings and paint driers.

Copal.—Fossil resins widely distributed throughout the tropics. Ranges in color from white through yellow, red and brown. Copals are soluble in alcohol and drying oils and are used for varnishes and enamels.

Creosote.—The light colored oily liquid obtained by distilling coal tar and containing ortho, meta and para cresol. Its chief uses are as a wood preservative and a disinfectant.

Dammar.—The resin obtained by tapping several species of trees found in Asia and in the East Indies. It varies from light transparent grades to black. Dammar is soluble in alcohol and turpentine and is used in high quality varnishes, lacquers and in sealing wax.

Dextrin.—Synonymous with amylin and British gum. Dextrin is the general name for a group of compounds similar to starch. It is a white non-crystalline powder with neither taste nor odor. It is used as an adhesive for envelopes and postage stamps and as a filler for cloth.

Eau de Cologne.—Originally an alcoholic infusion of various plants so named from the place of manufacture. It is now prepared by blending essential oils with alcohol and still holds a ranking place in perfumery.

Elaterite.—An amorphous dark brown natural asphaltic bitumen. It ranges from a soft elastic to a hard brittle mass. It has a high fusing point and is of comparatively little importance due to its occurrence in rather small amounts.

Emery.—The name given to the natural occurring mixture of the mineral corundum, magnetite and others. It is very hard and is used as an abrasive both as a powder or as blocks or wheels.

Ester Gum.—A gum prepared by combining glycerine and rosin with the aid of heat. It is less sticky and brittle than ordinary rosin and is largely used in the manufacture of spar varnishes.

Feldspar.—The name given to a group of minerals found in a variety of colors and as alumino silicates of alkali metals and alkaline earths. They consist of a crystalline construction, quite hard and found in the United States and various parts of Northern Europe.

Formalin.—A solution of 40 per cent concentration of formaldehyde. It has a pungent odor and it is used as a disinfectant, preservative, and in the manufacture of synthetic resins.

Fuller's Earth.—A hydrated compound of silica and alumina having a grayish brown color and a smooth greasy feel. It is used as a filtering material for vegetable, animal and mineral oils from which it removes the basic colors. Used also as a pigment filler.

Galbanum.—A gum resin from a plant native of Persia. It varies in hardness, is more or less translucent, yellowish brown in color and of a bitter taste. Used in medicine.

USEFUL INFORMATION CONCERNING THE MATERIALS CALLED FOR IN THIS BOOK

Gas-Tar or Gas-Works Tar.—Coal tar produced as a byproduct in the retorts in the manufacture of illuminating gas.

Glue.—An adhesive made from gelatine obtained from animal hoofs and hides, from fish heads, or from bones. Some glues are also made from blood or casein. The hardening of glue is due to the loss of water.

Graphite.—One of the several varieties of natural occurring carbon. It is found in two forms both of which are good electrical and heat conductors. Graphite is used as a lubricant, in making crucibles, electrodes, and in the "lead" in lead pencils.

Gum Ammoniac.—A gum resin derived from an herb in Central Persia having an unpleasant odor and a reddish color. Used in medicine.

Gum Arabic or Acacia.—The gum obtained by tapping a species of tree found in Asia, Africa and the East Indies. It is used in making inks, as an adhesive and as a filling material in textiles.

Gum Thus.—Also frankincense. A resin from the Norway Spruce Fir. It is used as an incense in ointments and plasters.

Gutta Percha.—A gum obtained by boiling the drippings of several species of trees found in New Guinea, Borneo and the Malay Peninsula. When vulcanized it forms a very hard material. It is used mostly for insulating electric cables.

Horn.—The protruding growth of the heads of cattle and other animals. Horns are hollow and are cut by saws, soaked for long periods and pressed to shape by hydraulic presses. The chief use of horn is in making knife handles, buttons and the like.

Hydraulic Cement.—A cement that sets or hardens when used under water. Varieties of these are Portland, puzzolan, and hydraulic lime.

Iceland Moss.—A lichen growing abundantly in the mountainous regions of Europe. It has a bitter taste, and is used medicinally.

Infusorial Earth or Diatomaceous Earth.—A hydrous opalescent form of silica the remains of aquatic microorganisms. It is absorbent, light in color and weight. Also called fossil flour, rotten stone and kieselguhr. Used in making dynamite.

Irish Moss or Carrageen.—A sea-weed growing in the Atlantic sea-coast. It is purplish in color and almost transparent. It is used for jellies and cattle food.

Isinglass.—A very pure form of gelatine obtained from the bladders of fish. It is used in making adhesives. Transparent sheets of mica are also called isinglass.

Jewellers' Rouge,—Colcothar.—A brownish red iron oxide obtained in the manufacture of fuming sulphuric acid. So called from its use as a polishing material.

Kaolin.—A natural aluminum silicate known commercially as Cornish clay. Its principal use is in the manufacture of fine porcelain which is almost pure kaolin. The cheaper grades are made with the addition of feldspar. It is a soft white powder insoluble in water, dilute acids or alkalies. It should be free from grit. Its cost is a few dollars per ton.

Lanolin.—The purified fat of the wool of sheep, containing 25-30 per cent water. It is a yellowish white mass and is used as an ointment base.

Lime.—The oxide of calcium, occurring in nature in combination with carbonic acid gas. It is obtained by heating limestone to drive off the carbon dioxide. Lime is white and is used for building, as a flux in steel making and as a gas absorbent. Also called quicklime.

Litharge.—The monoxide of lead, yellow in color and made by heating the metal in a reverbatory furnace. When ground it is used as a pigment, in glass manufacture and in the glazing and fluxing of earthenware.

Lithopone.—A white pigment consisting mostly of barium sulphate with about one third zinc sulphide and a small amount of zinc oxide. It is used in the making of paints and inks and as a filler for rubber and oilcloth.

USEFUL INFORMATION CONCERNING THE MATERIALS CALLED FOR IN THIS BOOK

Logwood.—The product of a leguminous tree native to Central America. It is used in dying, the preparation of ink and in medicine.

Lye.—The general name given to solutions of caustic alkalies.

Malt.—A product made by arresting the germination of grain by the removal of water through the application of heat. It is used in brewing.

Marseilles Soap.—See castile soap.

Mastic.—A gum-resin exuded from a tree found in the Mediterranean countries. It is used in varnishes, adhesives and chewing gum.

Meershaum.—A soft light colored hydrated magnesium silicate found in Asia Minor. It is used in making smoking pipes and holders.

Oil of Mirbane.—Nitrobenzol used in perfumery as a cheap substitute for oil of bitter almonds, also as a solvent and in the manufacture of dyes. It is poisonous.

Olein.—The glyceride of oleic acid and the fluid constituent of most fats and oils, more abundant in vegetable than in animal oils.

Ox-Gall.—When purified a yellowish-green soft solid or powder prepared from ox bile.

Parchment.—A tough durable waterproof paper made by treating cellulose paper with sulphuric acid and then rinsing it in water.

Paris Green.—A double compound of copper arsenite and copper acetate used as a pigment. Called also Scheele's Green and Schweinfurth Green. Very poisonous.

Pitch.—Pyrogenous residue varying from a viscous liquid to a brittle solid of dark color and fusible. Obtained chiefly from the destructive distillation of coal, bones, wood and various residues.

Plaster of Paris.—A partially dehydrated calcium sulphate made by heating gypsum. It is used for making casts and in plasters and cements.

Precipitated Chalk.—Pure calcium carbonate prepared by precipitation. Used in medicine.

Pumice.—The porous volcanic glass so formed by very rapid cooling. When ground it is used as an abrasive and in the preparation of tracing cloth.

Putty Powder.—Tin oxide in a crude form used in the manufacture of enamels, for grinding glass and for polishing.

Pyroxylin.—A solution of nitrocellulose in ether, ethyl acetate and amyl acetate. It is used in the manufacture of artificial leather, celluloid, rayon, films, molded parts and lacquers.

Quartz.—A variety of silica either colorless or colored such as topaz and amethyst. It is used as an abrasive, in ceramics and for lenses. Pure fused quartz stands extreme changes in temperature without breaking. It does not absorb ultra-violet light.

Quassia.—A bitter wood obtained from various trees native of the tropics. Used as a medicine.

Quicklime.—The oxide of calcium manufactured by the calcination of limestone. On addition of water it slakens forming the hydrate of calcium or slaked lime.

Red Lead.—The oxide of lead, red or orange-red in color. It is used as a pigment and has great covering and protective power. Called also minium.

Roman Cement.—The product obtained by burning and grinding sandstone. It contains calcium carbonate, silica and alumina. Although not as strong as Portland cement it sets much more quickly.

Rosin.—See Colophony.

USEFUL INFORMATION CONCERNING THE MATERIALS CALLED FOR IN THIS BOOK

Sandarac.—Also Australian pine-gum or white gum. It is obtained from a tree and used in varnishes.

Soap.—The material obtained by treating a fat or oil with a solution of caustic. Sodium hydroxide yields a hard soap and potassium hydroxide gives a soft soap.

Spanish Whiting or Chalk.—A variety of soapstone or talc found in Spain.

Spermaceti.—The white crystalline wax obtained from sperm oil. It does not yield glycerine when saponified. At one time it was used in candles, but is now used as a high grade wax.

Stearin.—The glyceride of stearic acid occurring mainly in solid fats or tallows.

Sweet Spirits of Nitre.—An alcoholic solution containing about 4 per cent ethyl nitrite. It is a clear mobile liquid, yellowish in color and of a fragrant odor. Used medicinally.

Talcum.—A hydrated magnesium silicate, greasy to the feel and occurring in plates or granular form. It varies in color from white to gray, green, brown and red. It is used as a filler in glazing and in cosmetics.

Traumaticin.—A solution containing about 15 per cent gutta percha in chloroform. Used like collodion.

Tripoli.—A form of silica originating from the decomposition of chert or of limestone rich in silica. Often confused with tripolite which is diatomaceous earth. True tripoli contains no diatoms. It is used in detergents, for polishing and as a paint filler.

Turpentine.—The oil obtained by distillation of the oleo-resin derived from various species of pine tree. It is used in paints and varnishes, in the manufacture of rubber, perfume and artificial camphor.

Umber.—A paint pigment consisting of a brown siliceous earth, manganese oxide and hydrated iron oxides. Burnt umber made by heating umber is much redder in color.

Venetian Red.—Red iron oxide pigments varying in chemical composition. Chiefly applied to the light red to distinguish it from the dark shades called Indian red.

Venice Turpentine.—An exudation from the larch, found in Europe and so named from the city whence it was shipped. Used in medicine.

Water-Glass.—A water soluble sodium silicate having a glassy appearance when hard. It is used for coating wood and stone, in cements, glazing, as a filler in soap and for preserving eggs.

White Lead.—Basic lead carbonate—A widely used paint pigment.

White Wax.—A bleached and purified quality of beeswax.

Wool Grease, Wool Wax or Wool Degras.—The oily material present in the sheep's wool, technically a wax containing no glycerine or glycerides. It is extracted from the cut wool with alkali soap solution or with sodium carbonate.

Wood Tar.—The bituminous product derived from the destructive distillation of wood, varying in properties with the source and quality of the wood used.

Yellow Wax.—Common beeswax, so called from its color. When new it is light yellow darkening with age. It is bleached and called white wax. Used for polishes, candles and floor waxes.

NOTE CONCERNING THE INDEXES

Two very complete ready reference Indexes will be found in the back of this book. The second or Supplementary Index, refers to items in most recent development. In using these Indexes, the Editors suggest that you consult every possible heading, as frequently a formula may be indexed under a very general classification instead of the particular one you are looking for.